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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

The recent discussion in Parliament on the Upper Burnett, Dawson and Callide Valley settlement schemes add interest to Mr. Eklund's notes on irrigation possibilities in Queensland now running through these pages. In this issue the practical side of water supply is considered and the notes should appeal to farmers generally. Maize is the subject of a special contribution, and the continued summary of experiments carried out by the Bureau of Sugar Experiment Stations furnish valuable data for the agricultural student. The famous Wanganella type of Merino sheep is discussed interestingly in a short special. Regular features cover a wide and informative field.

Co-operation.

Co-operation, like Mesopotamia to the Imperial statesmen of the last generation, has become a blessed word in the farmer's vocabulary; and while the attention of agriculturists is being focused more strongly than ever on the need for business combination, it may be well to give some time to a short review of its guiding principles. Co-operation is not a panacea for all the ills of the farming industry; there is no particular form of magic in the word; it is not a sort of cult covering all the farmer's corporal and spiritual necessities; its adoption does not involve an abandonment of common-sense business principles; it is no remedy for incompetent or out-of-date farming. All it means, briefly, is just a group of individuals with mutual interests combining to secure by prudence, efficiency, and mutual aid more equitable business conditions. The success of the co-operative movement in other countries, particularly among small holders in Denmark, has generated an enthusiasm for a general application of its principles—principles often misunderstood by some of its most clamant advocates. It must, however, be remembered that success in co-operative endeavour, like success in other business ventures, can only be attained by carefully-planned growth and well-directed effort, in which every member of the

combination has been educated to a proper appreciation of the merits and difficulties of this kind of commercial or industrial activity. To be faced at times with almost insuperable obstacles and to meet with discouraging setbacks is a common experience of any co-operative organisation.

Education is Essential.

In order to prepare co-operators for these common experiences of co-operative ventures, to strengthen them in their loyalty and good will towards their own enterprises at inevitable crises in group action, education is indispensable. In prosperous co-operative organisations there is a bond of interest created and maintained only by a constant feeling on the part of members that their venture is well worth while. Such a feeling is engendered and intensified by the sort of education that cultivates a sound knowledge of, and a firm faith in, the underlying principles of the co-operative movement.

Farmers and Co-operation.

Production and marketing must necessarily be on a large scale plan if they are to fit in with the demands of modern conditions, and to the farmer the easiest way to engage in big business is through co-operation. A co-operative enterprise is primarily one of business. Its object is to reduce costs on the come and go of the farmer's needs and products; to cheapen supplies, to lower production costs, to improve marketing facilities, and to provide adequate credit. The materialistic aspect of co-operation is the side that makes the first and strongest appeal to the farmer, but in his absorption in the prospects of immediate material gain he often loses the true spirit of co-operation, the spirit that is of real social significance. "Once a society becomes a soulless corporation its days are numbered." We quote Plunkett, the great Irish authority: "How many co-operative societies, starting with high hopes, and apparently inspired vision, have failed because the spirit of mutual aid has become atrophied and died?" "Co-operation," says Smith Gordon, "is the concrete expression of the associative spirit which is ever present in humanity. It represents the reaction in ordinary men of humble position against the tyranny of a social order which has thrown all the advantages of combination into the hands of the rich and powerful."

Co-operation means Mutual Aid.

The life-infusing force of the co-operative movement is the spirit of mutual aid. Agricultural co-operation the world over is rooted in economic necessity; it develops from a real need for mutual aid, and though a product of hard, cold realism it is not without a palpitating idealism—the true co-operative spirit without which the movement would be as a husk without corn. Queenslanders have no need to look beyond the borders of their own State for outstanding examples of co-operative success. In the dairying industry alone co-operative progress has been phenomenal. Co-operative principles are being extended to other branches of the farming industry and further extensions are planned. The need for united effort, the primary factor, is already sharply felt in every section of the industry, but there are other essentials which the co-operating farmer must also take into account. Sound business must be the basis of any new organisation. It must be competently directed by men who mean business and who understand business; its members must be taken into the confidence of its directorate; they must fully realise the aims, possibilities, obstacles, and responsibilities, individually and collectively, that pertain to the undertaking. Experience teaches that each and every co-operator should have a clear and complete knowledge of the principles of co-operation. Co-operative success is otherwise bound up in sufficient business; faith in the co-operative idea; existence of the real spirit of mutual help; adequate capital; sound accountancy; loyalty; leadership—and managerial brains at least equal in quality to the brains of the entrenched interests that co-operators will have to fight.

IRRIGATION IN QUEENSLAND—IV.

BY H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

This survey of irrigation possibilities in Queensland commenced in the July Journal with an historical note. In the August number irrigation on the Lower Burdekin was reviewed, and the September instalment covered irrigation in the West. The widespread interest now centred upon land settlement in Queensland, and the general practical development of the forward Government policy in relation to Agricultural extension and the enrichment of rural life in this State, makes the publication of Mr. Eklund's observations particularly timely. The review will be continued through succeeding issues of the Journal.—Ed.

PRACTICAL CONSIDERATIONS.

> "Wherever one finds the most valuable crops, the highest-priced plants, and the greatest prosperity, there one finds Irrigation. With Irrigation the *element of chance* is eliminated. Under the clouds farming is a lottery. The questions are always: 'Will it rain?' 'Will it rain enough?' 'Will it rain at the right time?' All these problems are settled with moisture at convenience and when wanted."—H. A. WELLS.

Pioneers in any direction are usually independent and self-reliant. People in general, and independent characters in particular, have more than their share of a human element called perversity. It is perversity which causes us to act against our better judgment when we go to extremes. Mixed with patience, perversity becomes persistence. Add good judgment and a capacity to learn from the experience of others and you have the potentially successful pioneer.

The only way to advise a perverse nature is to tell it *not* to do what you would wish. The man with good judgment will give your "do so" a hearing; think it over, perhaps argue about it, if he does not quite get your meaning; but when he has satisfied himself that your advice was good he will act on it. The perverse man will do the opposite. The following pages are not for the perverse man.

Galileo said, somewhere back in the sixteenth century, that man knew more about the stars in their courses than about the laws governing the flow of water on his own earth. The statement is equally true to-day. Probably the only thing about water that is *nearly* understood by everyone is that "water will find its own level."

This principle governed the first attempts at artificial agriculture. Water was conserved at a high level and let out to a lower level, where the crop was grown. At all events it obeys the laws of gravity. Hence this method of irrigating is called "Gravity system." Nearly all authors and writers on the subject, even in Australia, apparently consider that nothing is worth while but "Gravity system," and yet the first system of irrigation tried in Australia and the one at present most firmly established is a pumping system. It is the most successful and the best known; even out in the far west of Queensland people would seldom enjoy fruits except for Mildura.

This is not to say that a gravity scheme cannot be a success. But a gravity scheme in a country like Australia is a pretty big undertaking, consequently it needs money and people and time to be a success. Some people have expressed the opinion that the Murrumbidgee scheme in New South Wales is not a success. If the crops obtained are so abundant as to cause a glut on the market it may not be a financial success just at once. But under normal conditions it is the *excess* of produce which eventually causes the demand for more, because it is the excess which compels the establishment of commerce* dealing with that particular product, and increases the price to all concerned. Until butter was produced in quantities much too large for home consumption it was a cheap commodity. As soon as the export market was established it became almost a luxury. The same thing is about

* Emerson's definition.

to happen with fruits. The one thing to do is to keep the quality good. The Murrumbidgee River is one of Australia's best assets, and, judging by the quality and quantity of fruit grown on the irrigation settlement, fruit is going to be dear in Australia.

There are lots of irrigation settlements in Victoria; quite a few in South Australia, and some in New South Wales besides Murrumbidgee; but there are none in Queensland. Irrigation is still entirely in the hands of the pioneers, and happily most of these are fairly successful. The most successful are those who know how little water to use; the least successful are those who use the most. Few measure the water applied, and in this case those who measure and know are more successful

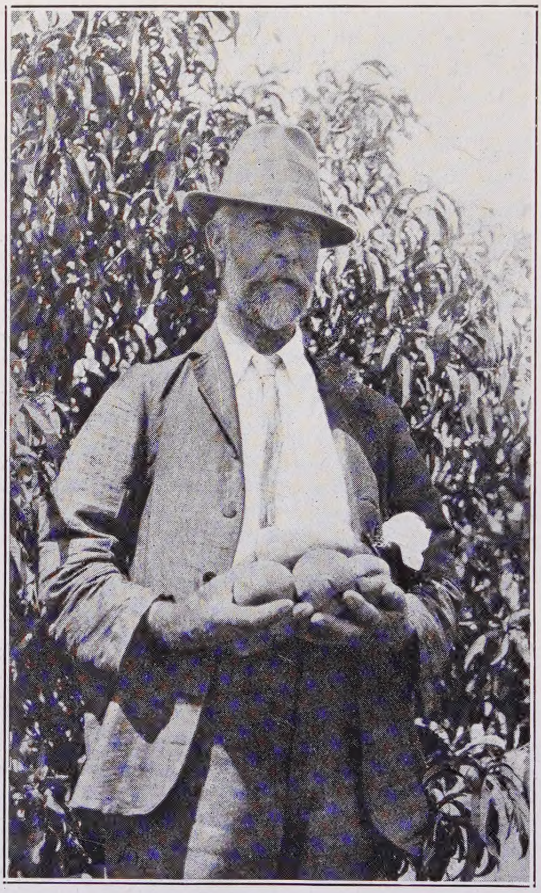


PLATE 62.—"FRUITS OF IRRIGATION"—MIRROOL-MURRUMBIDGEE SCHEME.

The peach-tree in the background is two years old. The size of its fruit may be judged by comparison.

than those who do not measure and do not know. And as to grading—those who grade properly irrigate the greatest area with the least labour.

Another error (fortunately but seldom made in Queensland) is that cultivation is not considered necessary when water can be applied at will. Cultivation is more necessary than ever, and happily the rapid growth of weeds in our climate compels frequent cultivation where irrigation is used.

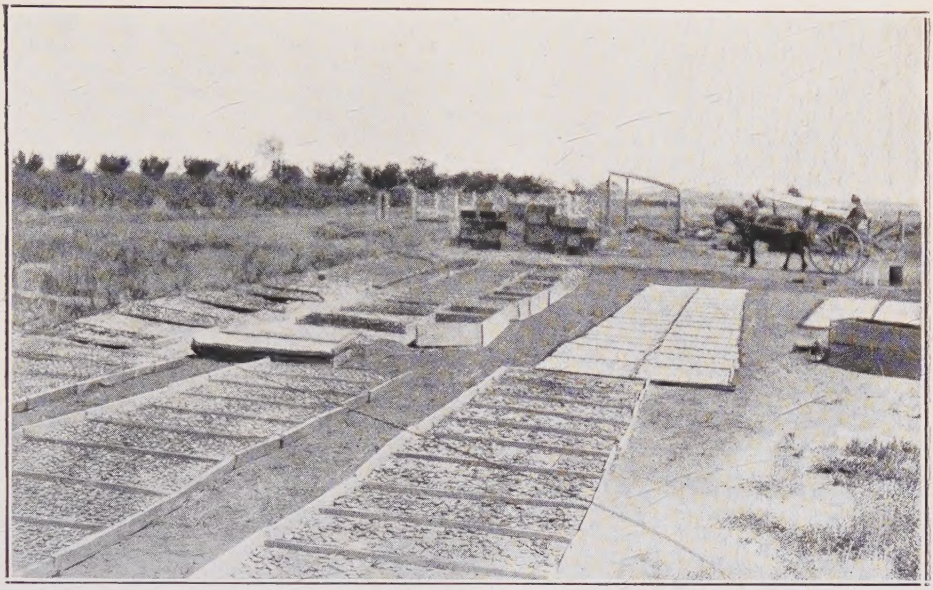


Plate 63.—Drying Peaches and Nectarines at Mirrool.

The fruit is first (usually) cut in half, the stone taken out, and the flesh put on wooden trays of convenient size for handling and stacking. The trays containing the fruit are then put into the sulphur chamber, a room nearly airtight in which 1 lb. of sulphur is burnt for every 1,000 cubic feet of space. Individual settlers usually erect rooms measuring 10 x 10 x 10 for convenience. Sometimes the fruit is dried whole with the stone left in, connoisseurs being of the opinion that this results in a better preservation of flavour. (It is an easy problem in simple arithmetic to prove that dried fruits are more economic to use than canned fruits. Dried fruits should, however, always be soaked in water over night after washing and then cooked without changing the water. This will be found to give a very different result to the more usual method of preparing dried fruits.)

Plate 64.—"Fruits of Irrigation." Sultana Vines at Mildura.

The "Murrumbidgee Irrigation Record" when first issued was to have used the motto "Irrigate; Cultivate and Irrigate." It was changed, however, to its present form, "Cultivate, Irrigate, Cultivate." It may yet be changed to "Cultivate, Cultivate, Cultivate." Cultivation increases absorption by the soil and assists retention. Where the supply is by gravity the settler usually gets a supply of, say, 1 acre foot as his water right. Not till he has used this up need he pay for water, but this is checked where the settler has to pump. Every explosion of an internal combustion engine, every turn of the wheel in the steam engine, and every revolution of the pump adds to the cost of production. Increased cost of production means reduced profit; hence every wise farmer will keep the cost of production down. How can he do this and yet get enough water for his crop?

1. By having first carefully graded his land.

2. By measuring the water he puts on.

THE WATER SUPPLY.

In Major Boyd's record of "Irrigation in Queensland," written some years ago, he remarks that "there is no branch of agriculture which has been so unaccountably neglected in Queensland as irrigation." This is undeniably true, but though it has been so, there is no reason why this "unaccountable neglect" should continue. Queensland is less fortunate than some other States of the Commonwealth in not having visible water supplies; but we have in this State very convenient underground supplies, and they appear more extensive than in any other State. As an illustration, consider the artesian supply available over practically half the area of the State. The coastal deltas of the Burdekin, Don, and, to some extent, the Burnett Rivers are huge natural reservoirs, which have proved to contain not only ample water, but good water and eminently suited for irrigation. The city of Townsville gets a large portion of its water supply from a similar delta, and the writer believes that a good underground supply could be obtained in many other localities.

The apparent reason then for Queensland's inactivity in this respect is that natural water supplies are not evident. But very few settlers have seriously tried to obtain water by sinking. Where it has been done it has met with success in a very great number of cases. It is undoubtedly heart-breaking work to go to the trouble and expense of sinking a well to a great depth without result. It is no wonder that so great a number of people place implicit faith in the water diviner. The fee of a "diviner" is small compared with the cost and disappointment (particularly the latter) of a "duffer."*

It may not be out of place to here mention that some well-known diviners have, by all accounts, done good work; but this profession, like all other callings whose members do not, like the B.M.A., belong to a M.A.S., suffers from an influx of a large number of quacks.

The surest and often the cheapest way of ascertaining if a water supply exists is to make a trial by some simple means. If water is met with the quality can be tested, so avoiding putting down an expensive well giving only brackish water. This is usually the point where nearly, perhaps, every diviner absolutely breaks down; though most of them profess the ability to "divine" the difference between fresh and brackish water.

The simplest and the most inexpensive way to test for water up to a depth of 100 feet is to get a good crowbar, say 8 feet long and 1⅛ inches thick, well steeled on one end and sharpened to a 3-inch chisel point as shown in sketch. The other end is made with an eye through which a ¾-inch thick ring is welded, large enough to accommodate a good ¾-inch diameter hempen rope. The only other tool required is about 4 feet of 2½-inch gas or water pipe, having a clack valve at one end and an eyelet for a rope at the other. The method of rigging this plant is as follows:—

Cut a springy sapling about 22 feet long, not too thick for the first 20 feet or 30 feet of depth (say 2 inches at small end without the bark) and rig this as shown in sketch. Start the bore by digging a hole about 2 or 3 feet deep, and when a depth of 5 feet from the surface has been bored drive into it about 4 to 5 feet boiler tube, or other pipe 4 inches in diameter. This should be driven to stand about 6 inches above the surface, and the dug hole then filled in. Drilling is subsequently continued as far as desired by jerking the line down, letting the spring of the pole lift the tools for each blow. The process requires a fair amount of knack, but when the art has been mastered it is not hard work. To avoid a crooked hole keep the cable fairly tight. If too much slack is allowed the tendency is for the hole to shoot off to one side or the other. The rope should be hooked through a swivel at the top of the pole and it must be kept rotating about one-eighth of a turn

* Dry well or bore.

each blow. If this is not done the hole will become flat, not round, and the "sand pump" (the gas pipe with the clack valve) will either not go down or else get stuck.

Until some water has been met with water must be poured into the hole to enable the borings to be lifted out by the sand pump. The churning action of the bar thoroughly mixes the cuttings with the water, and by rapidly raising and lowering the sand pump the mud is picked up and may be raised to the surface.

The art of drilling with the spring pole consists in giving the jerk to the line at the right instant. This instant occurs just when the spring of the pole has lifted the tools and commences to return; not before and not after. A little assistance should also be given to the pole just when it commences to lift the tools. This is necessary to get the longest blow possible.

When water has been struck the amount of the supply may be judged from the time it takes to rise after the hole has been cleaned out. While the sand pump can be used to empty the bore hole the supply is not likely to be very large, but if no impression can be made on the supply by bailing it will pay to put a hand or draw pump on to test. From such a test it will be evident whether it will pay to use a windmill and small pump, or if it would be better to sink a well to the supply. If the strata in which the water is met with are open and porous a 3-inch hole may

Plate 65.—A "Hand" Bore or Bore Sunk by Spring Pole Method in the Near West.

meet all requirements for stock and domestic supply, but if close grained it is necessary to sink a well. As a general rule the ground water supply to a well or bore on the eastern side of the range is proportional to the area of water-bearing strata exposed; but to allow for the "draw-down" effect, if pumping up to the capacity of the bore or well, this theoretical supply capacity should be divided by two. In all cases of doubtful quantity, or where the volume as gauged by the supply from the bore appears barely but nearly sufficient, the well is recommended on account of the extra storage capacity in addition to the greater percolation area exposed.

Irrigation cannot be successfully carried out without a reliable supply of suitable quality. The best time for testing supplies is after dry weather, and the longer the preceding drought the more reliable the test. Any supply which proves good at such a time is more likely to tide the farmer over a bad period than a supply met with in an ordinary season.

Even a moderate supply, if constantly pumped by means of a windmill, can, with care, be made to irrigate quite a fair area. The capacity of the windmill may,

of course, be augmented by having a provision for storage—the larger the better. In the semi-arid districts of America the use of the windmill has lately come very much into vogue, and the Agricultural Department's Bulletin No. 394 quotes instances of the areas that can be irrigated by this means. From 4 to 25 acres per irrigating season are successfully dealt with under various crops, the area irrigated apparently depending on the amount of storage provided, the care exercised in using the water, and the lift. The capacity of the windmill as the source of power for irrigation pumping is, of course, limited; but it is quite clear that more can be done in this direction than has ever been attempted in Queensland.

Careful selection of the site for a mill has a good deal to do with the area it can be made to water. In some cases one windmill is made to pump from two bores situated close together, and owing to the balanced action thus obtained the method is very efficient. See sketch.

PLATE 66.—MALLEE COUNTRY BEFORE—

PLATE 67.—AND AFTER IRRIGATION

Power of Windmills.

The power supplied by a windmill depends essentially on—

1. Velocity of the wind.
2. Size of the vane wheel or "mill."

The table given below is the summary of tests on a 14-ft. mill tested by officers of the Agricultural Department of the United States, America, with the load varied to get the best results.

Velocity of wind in miles.	Horse-power produced.	Hours per month.	Total horse-power.	Speed of mill in revs. per min.	Load in pounds per stroke.
0–5	0·01	209·9	2·10	2·0	—
6–10	0·27	283·6	76·57	20·0	4·35
11–15	0·85	142·2	120·87	29·5	10·35
16–20	1·80	62·3	112·14	38·0	14·20
21–25	3·45	22·6	77·97	45·0	26·35
26–30	4·82	9·6	46·27	51·0	29·20
31–35	5·60	3·3	18·48	55·0	31·0

The most usual velocity clearly was from six to ten miles per hour and the largest number of horse-power hours obtained when the velocity varied from eleven to fifteen miles. The table is useful in showing what could be done if the load were varied to suit the strength of breeze, but as yet there is no satisfactory means of doing this. Several makers have tried to discover some arrangement whereby an increase or decrease in the speed of the mill would be automatically accompanied by a lengthening or shortening of the stroke. All such devices have apparently failed in operation, and users are therefore compelled to decide on the most suitable load. To arrive at this by calculation is rather difficult, but it will pay to carry out a few experiments at a time when the wind appears to be blowing with the most generally prevalent velocity. A fairly good method of getting at the velocity of the wind, and quite sufficiently accurate for comparisons, is to drop a light feather of the kind used for pillows or mattresses from a height of about 10 or 12 feet, or, better still, from the tower of the mill, and not by stop-watch how long it takes to travel a certain distance. The distance in feet that the feather travels in a given number of seconds will give the rate in feet per second. This multiplied by .68 will give the velocity of the wind in miles per hour.

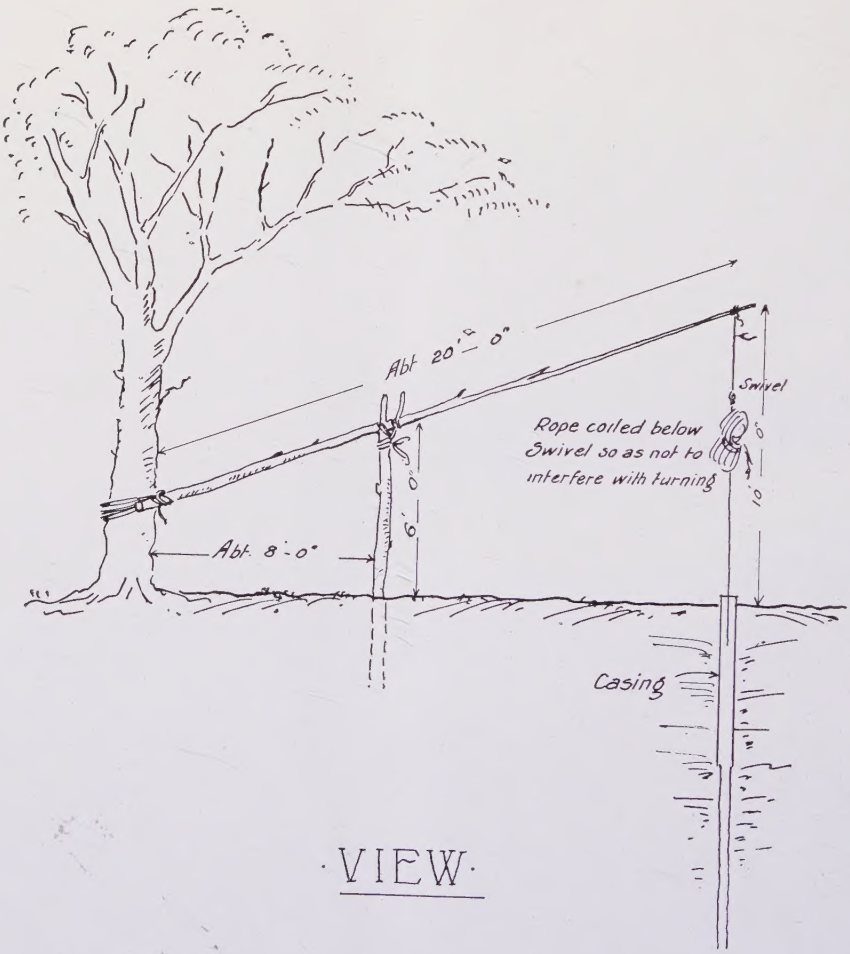
The power required will depend on the height to which water has to be lifted. A theoretical horse-power is defined as the power required to lift 33,000 lb. to a height of one foot in one minute. One Imperial gallon of water weighs 10 lb. (approximately) and the theoretical horse-power will, therefore, lift 3,300 gallons 1 ft. in one minute, or 60 feet in one hour. But in actual practice this figure is never reached owing to losses of energy occurring, partly in friction and partly in imperfections of any machine used. In pumping water there is also a certain amount of leakage past a bucket or piston, and this factor (called "slip") also reduces the efficiency. Generally, the type of pump employed for windmill work should give an efficiency from prime mover to water delivered of about 50 per cent. Very much better efficiencies can be obtained with high-class pumps, but for ordinary and smaller pumps 50 per cent. efficiency is a fair average. If a windmill develops one horse-power the actual quantity of water that may be expected with a lift of 60 feet is only 1,500 gallons per hour, or half the theoretical quantity. Where the lift is only 30 feet the quantity pumped by the same power may reasonably be expected to be 3,000 gallons per hour. Assuming that the water-lifting wind blows for eight hours during the day, 24,000 gallons, or a little more than one acre inch is supplied during this time. This quantity is too small for economic distribution during pumping, and it is therefore necessary to provide sufficient storage to have at least 60,000 gallons, or about three acre inches, readily available to economically irrigate one acre.

The size of mill to develop one horse-power in a ten-mile breeze is not a standard size, being apparently about 15 ft. diameter. Stock sizes run 8, 10, 12, 14, 16, 18, and 20 feet; larger sizes than these generally being made to order. Makers' catalogues do not give the rating of a mill at per horse-power, the more usual method being for the maker or agent to quote for a mill of a size warranted to lift a given quantity of water from a certain depth per hour or per day. This method has the advantage that the decision of size is left in the hands of those who, presumably, have some experience of this class of work. But it is not a useful

or convenient method for the farmer or pastoralist, who is thus placed wholly in the hands of the agent. A definite horse-power rating based on an eight-mile breeze as the selected standard would enable users to make their own comparisions, without debarring makers or agents from giving additional advice should this be desired. Some windmills may be better than others according to varying conditions and localities, and where the wind is generally heavy and choppy it may be necessary

BORING:

· by · Springpole ·



· VIEW ·

to sacrifice efficiency and flexibility for ruggedness and strength. The local resident probably knows best from actual experience of weather conditions in his district which kind would suit him best. Makers claim that the difficulty in obtaining such a rating lies in the fact that even a comparatively "steady" breeze fluctuates considerably. The fluctuations are usually very rapid and make observation difficult.

But where a fair number of mills are turned out and parts are standardised only one carefully conducted rating is necessary for each size, and to maintain a

good product this may be checked from time to time as opportunity offers. Some form of rating must be adopted even in obtaining the water-lifting capacity, and the apparent discrepancies in various mills are probably accounted for by the absence of any scientific method in determining the work performed by the mill.

Some Australian manufacturers are now making windmills up to 30 feet in diameter. A 30-ft. mill should be capable of developing about five theoretical horse-power in a ten-mile wind. A mill of this kind should be useful to those who propose to commence inexpensive irrigation on a small scale. Given a reasonably good water supply within 100 ft. of the surface, and a storage capacity of, say 60,000-80,000 gallons, such a mill should provide ample power for the watering of from 5 to 20 acres, depending on crops to be raised. If the farmer can, in addition, afford to install an engine as an auxiliary, he may be said to have reached the present economical limit in the irrigation of a small area.

The question of "back gearing" a windmill is sometimes a puzzling feature to those not actually having had experience. Back gearing is necessary where the mill has to lift to a great height, or a great quantity of water per stroke, but the work done is accomplished at a reduced rate. The actual power developed by the geared mill is, therefore, if anything, rather a little less than that of the direct-acting. Geared mills are also used where light winds generally prevail, but they should not be necessary for moderate lifts or where fairly good velocities of wind are the rule. The chief differences of the two kinds may be thus stated:—The direct-acting windmill requires a greater velocity of wind to start it, soon reaches its maximum rate of pumping, and continues while the wind is good, but soon ceases when the wind lightens. The geared mill starts in a lighter breeze, takes a longer time to reach its maximum rate of output, maintains it over greater fluctuation in the wind, and ceases pumping more slowly. As might be expected the slip in a direct-acting windmill pump is greater than in the geared mill, especially at high velocities and a short stroke. The former is rather simpler in construction and perhaps generally a cheaper machine. In choosing a mill the points governing the decision do not materially differ from those to be observed in choosing any mechanism.

The mill should be strong and simple, should not require frequent oiling or attention, and parts liable to wear should be easily accessible for examination, adjustment, or renewal. It is an additional security to the buyer to deal with a firm bearing good repute for excellence of product.

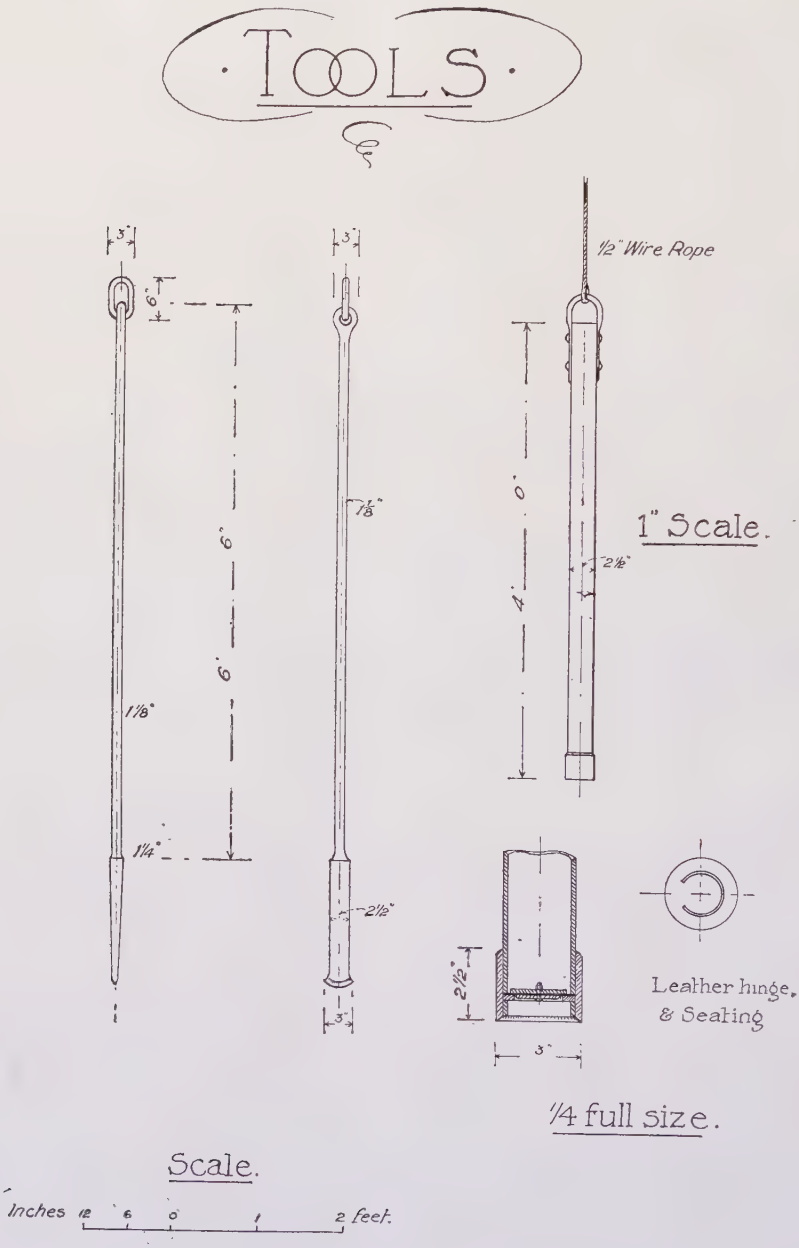
A common error in adjusting mills is making the stroke too short. A short stroke (up to a point) puts as much work on the mill as a longer one, owing to the more frequent stopping and starting of the water column, the inertia of which has to be overcome each time the rods lift it. The stroke should be just the right length, and a few experiments in this direction would soon convince users that economy is obtainable in this direction.

When pumping by windmill from a well, a simple and inexpensive device can be used to steady the flow. The device consists of two 2-in. pipes attached to form an air vessel on the water column (see sketch). These have proved very effective where tried.

Table IV. has been compiled as indicative of what a windmill properly adjusted can do in a ten-mile breeze. To estimate for an eight-mile breeze reduce the number of gallons by approximately one-third.

An analysis of meteorological observations given in Table V. will show that the average velocity of wind at Brisbane Observatory, from 9 a.m. to 9 p.m., is practically only six miles per hour. The average velocity for each month is also shown. It must be noted that the observations were only twelve hours each day, and any wind blowing during the night has not been considered. From a utilitarian point of view the times of morning and evening observations are too early and too late respectively to show what windmill users are anxious to know, *i.e.*, the period each day during which the wind is strongest. General observations would indicate that had observations been taken at 11 a.m. and 7 p.m. the average velocities would be

higher. This is especially the case in the western districts, and it is hoped that as anemometers are installed wind velocities will be observed each hour of the day until it is discovered what hours the maximum velocity is attained. Such information



carefully compiled will prove of immense value to pastoralists and settlers, who, in view of a reduced natural flow from bores may, in the near future, have to depend largely on the wind for their water supplies.

SKETCH

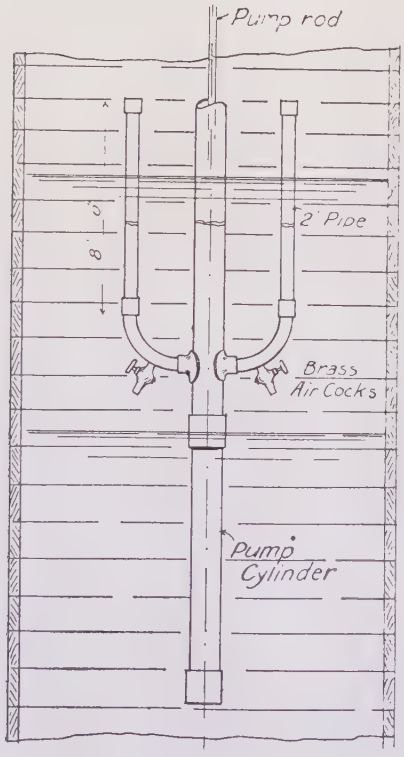
— shewing —

2" pipes acting as

Air Vessels

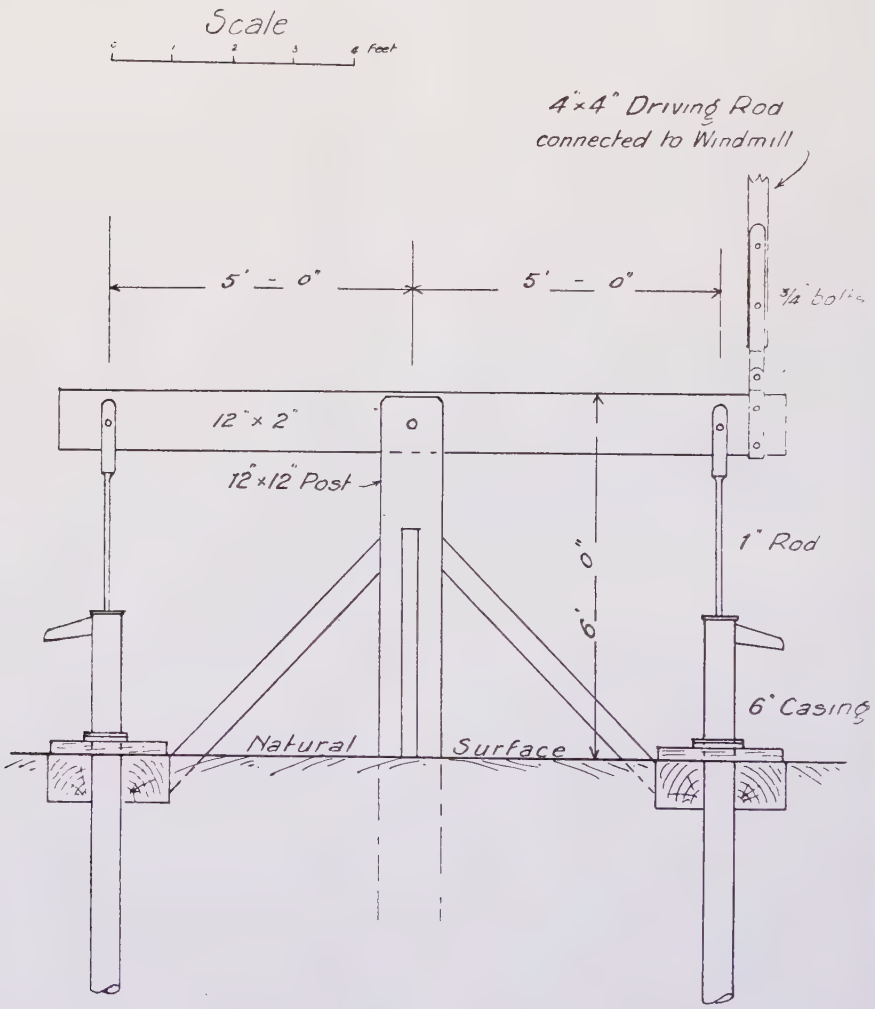
Scale

Inches 12 0 1 2 3 Feet



SECTION

Arrangement shewing one Windmill pumping from two Shallow Bores, near Stockton. Cal.



Elevation.

(*The next instalment will deal with Surface Supplies.*)

MAIZE OR INDIAN CORN.

By F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch.

The importation of South African maize has again directed attention to our old friends Supply and Demand which, according to economists, regulate the price of commodities. As far back, however, as 1816 an anonymous writer asserted that "price depends on the state of the market, which is not merely the actual present proportion of the supply to the demand but also the expected supplies either from our own resources or from foreign countries, as well as the probable increase or decrease of the demand."

In the August number of the "South African Journal of Agriculture" this season's maize crop is estimated to yield a surplus of 5,000,000 bags for export; in other words, South Africa has produced over 450,000 tons of maize beyond their own requirements. The state of the Queensland market offers an opening for a little of this great surplus. During the month of August 23,257 bags were landed at the port of Brisbane, followed by similar shipments in September. The approximate weight landed during the two months being 4,000 tons. This indicates that there still remains a profit to be made in the importation of sound, dry maize, free from insects likely to be injurious to stored grain.

Maize in the United States is spoken of as corn, which term was used by our Anglo-Saxon ancestors to mean the grain of any cereal plant used as food for man. The term Indian corn being used by the early settlers in North America, to indicate the kind of grain cultivated by the original inhabitants of that country.

The general practice of disparaging the past prevents our seeing the present in its true perspective. Before the first white man landed in the sub-tropical and tropical portions of the Americas, the cultivation and selection of Indian corn had received considerable attention, both by the Incas of Peru as well as at the hands of the North American Indians, who grew a hard, round type of grain well suited to put up with storage under adverse conditions; further, it packed well and was therefore of easy portage. Our adventurers of the sixteenth century have left a series of records as to the crops and inhabitants of the various countries visited. This mine of information is open to all readers of such voyages as were published by Hakluyt, Portlock, and others which have still this merit: that they yield:—

"A certain freshness of the fields,
A sweetness as of home-made bread;
For if the flour be fresh and sound,
And if the bread be light and sweet,
Who careth on what mill 'twas ground
Or of what oven felt the heat?—
Unless, as old Cervantes said,
You are looking after better bread
Than any that is made from wheat."

Columbus and other early voyagers introduced maize to other parts of the world. No doubt it reached Europe and Africa at the end of the fifteenth or early part of the sixteenth century. On its first introduction it appears to have been grown in the countries bordering on the Mediterranean and became known in England as "Guiny wheat" [and in France as Turkish corn (*Ble de Turquie*)—Ed.]; the accepted name during the early part of the sixteenth century appears to be "Turkey wheat," which indicates the usual source of supply as being Turkey. This may not, however, be correct, as the name may only be that of the place of shipment, as is the case with the commodity sold as Turkey rhubarb, which the Turks had the credit of producing, when as a matter of fact the actual country of origin was China, whence it reached Asia Minor *viâ* Russia. The Chinese, according to records found in Paris, appear to have cultivated maize for some centuries, and it is just possible that the first maize grain to reach London came from the Levant and the actual place of its production, China.

According to Harshberger, Mexico appears to have been the original home of the maize plant, although there is no absolute proof of this, it is now generally accepted as being correct.

Maize (Zea Mays L.) belongs to the order Gramineæ or grass family, which includes the plants producing our food grains, such as wheat, barley, oats, and rice as well as the goat of the wheat family, rye, the distinguishing features of commercial maize being the separation of the pollen-bearing from the seed-bearing flowers.

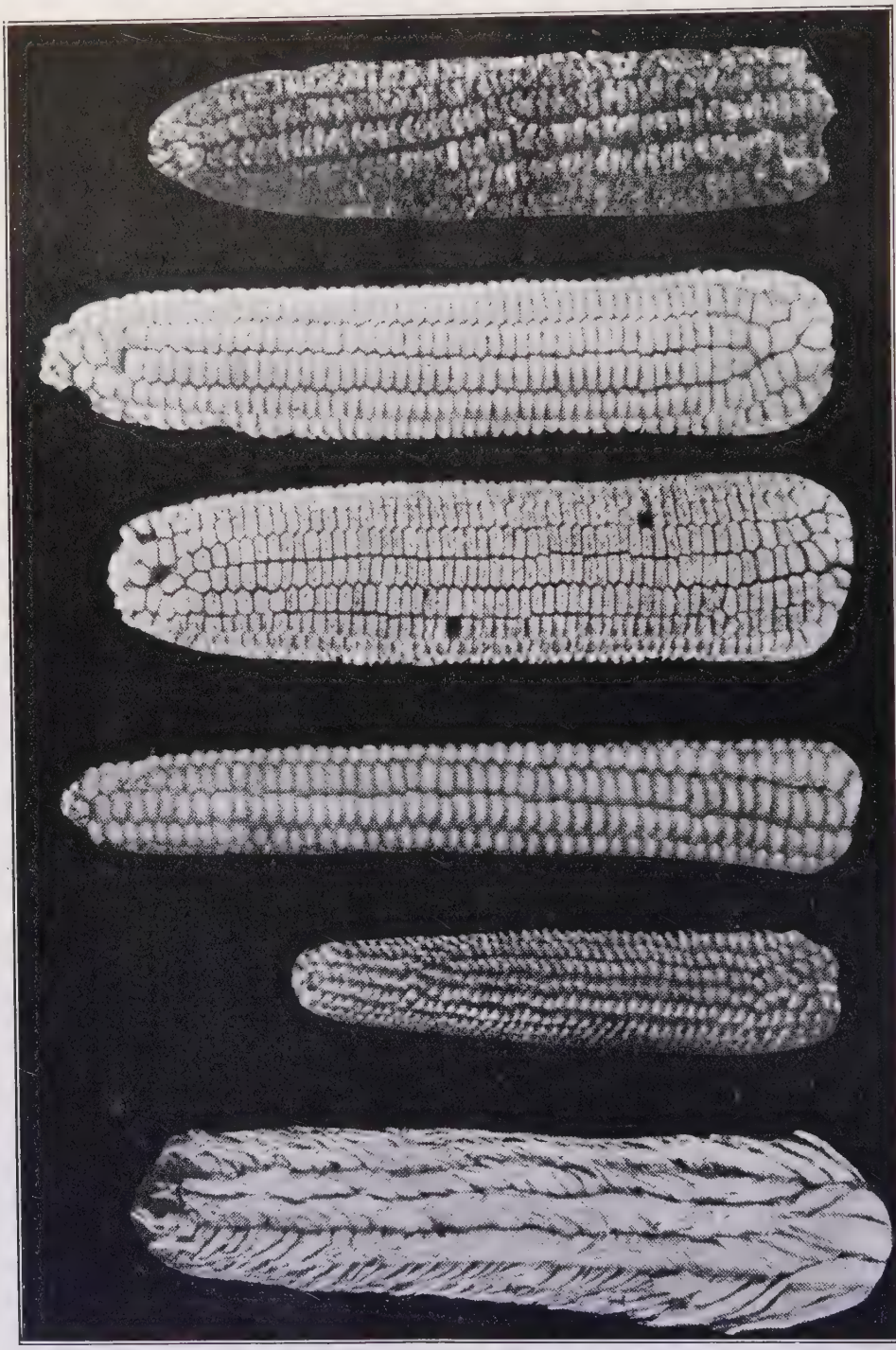


PLATE 68.—MAIZE OR INDIAN CORN.

The nearest relative of maize is Teosinte, with which maize crosses readily; a natural hybrid between these cultivated grasses was described by Watson under the name of Zea canina. From similar crosses Harshberger arrived at the opinion that maize originated from a hybrid of Euchlæna and normal Teosinte. Montgomery, however, reached the conclusion that maize and teosinte had a common progenitor; further that the ancestral form was a large much-branched grass "each branch being terminated by a tassel-like structure bearing hermaphroditic flowers."

Hayes and Garber have pointed out that this theory is strengthened by the types of inflorescence which now and then appear, and the not uncommon occurrence in self-fertilised maize, of plants with a tassel bearing both male and female organs. The many different varieties of cultivated maize are all included under the name Zea Mays L., and were divided by Sturtevant into "species groups" (sub-species) the most important of which are shown in the accompanying illustration after Montgomery.

The six principal types of maize, reading from left to right:—Podcorn, popcorn, flint type, dent type, flour or soft corn, sweet corn.

Plate 69.

Flint Maize, showing enclosure by horny endosperm. | Dent Maize, showing horny endosperm at sides.

The distinguishing characteristics of the six types are—

Zea Mays tunicata, or podcorn.—Each kernel enclosed in husk; the ear is also enclosed in husk. In true podcorn all forms of kernels may be found. A few podded kernels may also occassionally appear in ordinary types of maize.

Zea Mays everta, or popcorn.—Kernels naked, not enclosed in pod or husk. The popping is due to the turning inside out of the kernel through the explosion of the contained moisture when heat is applied. Two forms of seed are common, one pointed at the top being known as rice popcorn; the other form is rounded like the flint type, and known as pearl popcorn.

Zea Mays indurata, or flint maize.—Grains smooth, roundish, not wrinkled, white starchy endosperm enclosed by a corneous or horny endosperm. This type is still largely grown in countries where the large seeded dent varieties do not mature and was the kind cultivated by the North American Indians and early American settlers.

Zea Mays indentata, or dent maize.—Grains dented, flattened with starchy endosperm extending to top of kernel, corneous or horny endosperm at sides; the shrinking of the starchy endosperm at the top of the grain causes the formation of the dent, from which characteristic it derives its name.

Zea Mays amylacea, flour or soft maize.—This kind is without corneous endosperm, therefore soft, in shape more like flint—that is, the grain is without indentation. The mummy corns of Peru and Mexico probably belong to this group.

Zea Mays saccharata, the sweet corn.—According to East the sweet corns may be dent, flint, or pop varieties which have not the ability to mature starch normally, the few starch grains produced being small, angular, and imperfect.

Other forms of maize are:—Zea canina (Watson), the Maiz de Coyote, a branching plant producing many small ears, on lateral branches. It is said to grow wild in Mexico, and can be produced by crossing common maize with teosinte. Zea Japonica, an ornamental kind with small flinty grains, cultivated in flower gardens for its striped green and white leaves. Zea hirta is a hairy South American corn, embracing both flint, dent, and pop types. Zea curagua is a form characterised by its serrated leaf edges. Zea ramosa (Gernert), a type with branching ears and highly-branching tassels. A new type from China has been described by Collins as having erect leaf blades with some upper leaves arranged in a monostichous manner, silks developing inside the leaf sheath, and grains with a waxy-like endosperm.

An interesting account of maize as it appeared to the gallant gentlemen who had the honour to subscribe themselves as servants of Sir Walter Raleigh appears in an account by Thomas Heriot, written about 1587, on the commodities that Virginia produced for "vietuall and sustenance of man's life usually fed upon by the natural inhabitants."

According to Heriot the natives of Virginia knew the plant under the name of "Pagatowr," which Heriot describes as "a kinde of graine so called by the inhabitants; the same in the West Indies is called mayz. Englishmen call it Guiny wheat or Turkey wheat, according to the countreys from which the like has been brought. The graine is about the bigness of our ordinary English peaze, and not much different in form and shape, but of divers colours—some white, some red, some yellow, and some blew.

"It is a graine of marvellous great increase: of a thousand, fifteen hundred, and some two thousand folde. There are three sorts, of which two are ripe in eleven and twelve weeks at the most, sometimes in tenne, after the time they are set, and are then of height in stalke about six or seven foot. The other sort is ripe in fourteine, and is about tenne foot high; of the stalks some beare foure heads, some three, some one, and some two—every head containing five, six, or seven hundred graines, within a few more or less."

From the above description it would appear that the maize resembling peas would have been of the round or flint type, as the flattened or wrinkled peas were not generally known during the Elizabethan period. The number of weeks to reach maturity and the colours of the grain are also interesting.

The native method of cultivation appears to have astonished these early voyagers, who expressed surprise at finding the land cropped without ploughing or digging. The only work put in appeared to be done a few days before sowing, when the men with wooden tools something in the form of a hoe with long handles, and the women with short peckers used by them when sitting, broke up the upper part of the soil to raise up the weeds, grass, and old cornstalks by the root. After a day or two's drying in the sun these were brought together and burned. At first it was thought that the ashes would be used to improve the ground, but it was noted that in the case where the heaps of ashes were too large they were not spread, nor was any care taken to plant the corn where the ashes lay. The corn was planted in the following manner:—Starting in one corner of the plot with a pecker, they made a hole and put in four grains, taking care that they were about 1 inch apart, and then covered them up with the surrounding soil, and so on throughout the whole plot, which appears to have been planted in rows about a yard apart, and the same distance between the holes in which the corn was planted. The crop was also interspersed with some form of peas and beans, as well as with Macocquer, Melden, and Planta Solis. The first of these (Macocquer), according to Heriot, meant any kind of pumpkin or melon; Melden was probably orache or mountain spinach; and Planta Solis obviously sunflower, which was described as "a great herbe in the forme of a marigolde about sixe foote in height, with the floure a spanne in breadth." In spite of these indifferent methods of cultivation it is recorded that heavy crops were produced. So much were these early settlers impressed with maize that comment was made on the great increase over the heaviest English wheat yield, which they put at 40 (Winchester) bushels to the acre produced by land "fattened with mucke, dung, or any other thing."

If we are to supply our market with its full maize requirements a greater production is necessary, which should come from increased yield per acre rather than from extended area. Farmers would, therefore, do well to pay more attention to maize selection for seed purposes and avail themselves of the selected strains offered by the Queensland Department of Agriculture. Better seeds can do a lot, but even these require the backing of sound cultivation, without which our yearly averages will still be below the economic minimum of yield.

Recent importations have again directed attention to the methods adopted by other countries, for the fixing of standards or grades for commercial grain. The

bases of such standards are the minimum weight per bushel, percentage of moisture, the amount of damaged or cracked corn, also the proportion of foreign material other than maize that the sample contains.

As regards the bushel weight it is well to note that the imperial bushel is larger than the American standard or Winchester bushel. Further, the sale of maize in Queensland is not by measure, but by the unit of 56 lb., which is miscalled a bushel.

Owing to the confusion arising from the misuse of the words indicating measure only, legislation has been passed in the United Kingdom making all sales on the basis of the hundredweight of 112 lb.

The volume weight of maize or other grain is an important factor in the determination of grade, and is best expressed by the actual weight in grammes of the contents of a litre measure. For purposes of comparison, it is well to note that an imperial bushel contains 36.35 litres, and the Winchester bushel 35.24 litres.

In the United States of America one of the accepted methods of moisture test is by the Brown-Duval apparatus, which has been adopted in Queensland as the best for quick determination.

For the purposes of the United States official grain standards the word corn (maize) means shelled grain of the flint or dent varieties, each determination of colour or damage being on the basis of the grain after the removal of foreign material and cracked corn.

The percentages, except in the case of moisture, are percentages ascertained by weight; in the Brown-Duval method the percentage is measured in cubic centimetres. As the weight of one cubic centimetre of water at its maximum density is one gramme, it follows that for all practical purposes the moisture content is given in weight.

Foreign material and cracked maize are defined as kernels or pieces of kernels and all other matter which will pass through a metal sieve perforated with round holes fourteen sixty-fourths of an inch in diameter, and all matter other than maize remaining on such sieve. Damaged grain includes all kernels that have been distinctly injured by heat, fermentation, or other causes.

The colours are divided into white, yellow, and mixed. White consists of maize of which at least 98 per cent. by weight of the kernels are white, a slight tinge of light-straw colour or of pink on kernels otherwise white not affecting the classification as white.

Yellow consists of maize with at least 95 per cent. by weight of yellow kernels, a slight tinge of red on maize otherwise yellow not affecting the classification as yellow.

Mixed consists of maize of various colours not coming within the limits provided for white and yellow.

White, yellow, and mixed corn are divided up into seven grades for each class, the requirements for grade 1 being as follows:—

No. 1.—White, yellow, or mixed.

(*a*) Shall be cool and sweet.

(*b*) Shall have a test weight per Winchester bushel of not less than 55 lb.

(*c*) May not contain more than 14 per cent. of moisture.

(*d*) May not contain more than 2 per cent. of foreign material or cracked corn.

(*e*) May not contain more than 2 per cent. of damaged corn, and no heat-damaged kernels.

The moisture content for grades 2, 3, 4, 5, and 6 are 15.5 per cent., 17.5 per cent., 19.5 per cent., 21.5 per cent., and 23 per cent respectively, the limit of foreign material or cracked corn being 3 per cent., 4 per cent., 5 per cent., 6 per cent., and 7 per cent. The amount of damaged kernels ranges from 4 per cent. in grade 2 to 15 per cent. in grade 6. All maize in grades No. 1 to 5 inclusive must be cool and sweet. No. 6 must be cool but may be musty or sour.

In addition to the above grades is one known as "Sample grade," which consists of any white, yellow, or mixed corn that does not come within the requirements of any of the grades from 1 to 6, or which has any commercially objectionable foreign odour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality.

For purposes of the Quarantine and Commerce (Trade Description) Acts, samples of South African maize were taken from the shipments landed at Brisbane. The samples obtained during the month of August have been examined, with the results as set out in the following tables, from which it will be noted that the minimum average and maximum of the several findings are given. With regard to the weight per litre in grammes, it can be taken, roughly, that 800 grammes equals 64 lb. to an imperial bushel. As far as the consumer is concerned the total percentage of sound grain is the most important factor. The importer, however, has the question of the

grains' keeping quality for his first consideration, which matter is determined by the moisture content. Maize fit for long storage should not exceed 13 per cent. in moisture, and be free from insects likely to be injurious to stored grain. Up to the present all the samples examined have been singularly free from weevil attack, and the average moisture content of 13.3 per cent. in the Flint type and 13.8 per cent. in the Dent type is also satisfactory.

Twenty-seven Samples of South African Maize (Flint Type).

	Weight of 1 Litre in Grammes.	Percentage of Moisture.	Percentage of Grain of the Type to which the Sample purports to belong.	Percentage of Coloured Grain.	Total Percentage of Sound Commercial Grain.	Percentage of Damaged Grain.	Percentage of Foreign Material.
Minimum ..	742·0	12·3	92·560	·275	94·040	..	·215
Average ..	762·0	13·3	95·106	1·847	96·953	2·486	·561
Maximum ..	797·0	14·2	97·720	6·560	99·720	5·400	1·520

Eleven Samples of South African Maize (Dent Type).

Minimum ..	710·0	12·1	93·472	·415	95·110	..	·120
Average ..	729·8	13·8	95·616	2·076	97·692	1·841	·467
Maximum ..	761·0	15·4	99·015	4·620	99·430	4·460	·700

In order to ascertain the feeding value of the different types, representative samples have been analysed by the Agricultural Chemist, Mr. J. C. Brünnich, who reports as follows:—

South African Flint maize—

Minimum crude protein	9.2 per cent.
Average crude protein	9.9 per cent.
Maximum crude protein	10.1 per cent.

South African Dent maize—

Minimum crude protein	9.5 per cent.
Average crude protein	9.8 per cent.
Maximum crude protein	10.1 per cent.

For comparison, analyses of Queensland samples of Dent maize were made, with the following results:—

Queensland-grown Dent maize—

Minimum crude protein	9.3 per cent.
Average crude protein	10.1 per cent.
Maximum crude protein	10.6 per cent.

It is interesting to note that the minimum amount of crude protein was found in a dent variety known as Golden Beauty, and the maximum in the Department's stock of Improved Yellow Dent and Red Hogan.

In the United States a number of experiments have been made in the selection and breeding of maize for a high protein content. After a series of experiments extending over twenty years it has been proved that the average percentage of oil that the maize contains can be greatly increased. That high-protein races may be produced has been shown by Hayes and Garber (1919), who suggest that numerous ears should be self-fertilised and analysed, those that appear of promise being then used and their breeding nature determined by progeny tests. As soon as homologous forms containing the desired characters have been isolated, they may be used as a foundation for the production of an improved strain.

The breeding of maize for a high-protein content may be a counsel of perfection; it remains, nevertheless, one of the matters that should not be lost sight of. In the meantime efforts must be directed to the production of more weight per acre. With the return of normal seasons we may again have a large quantity of maize of our own production for sale, and if the quality is right—that is to say, good samples containing 98 per cent. or more of hard commercial maize with a moisture content of 14 per cent. or less—we shall be able to hold over our crop if so desired, or ship it to any other part of Australia, where a demand exists for good sound corn. Whatever the quantity per acre may be, maize with a high moisture content, or samples containing a large amount of damaged grain or weevils, will not in the long run pay. Quality must be our guide; the best even in maize cannot be too good.

PLATE 70.—SATISFIED WITH QUEENSLAND'S FUTURE—COTTON DELEGATION BACK IN LONDON.

Left to Right—Hon. J. A. Fihelly (Agent-General for Queensland), Messrs. W. R. Crompton Wood, Mrs. Crompton Wood, Harold Parker, Harding, Armstrong, and T. J. Waittington (Agent-General's Staff).

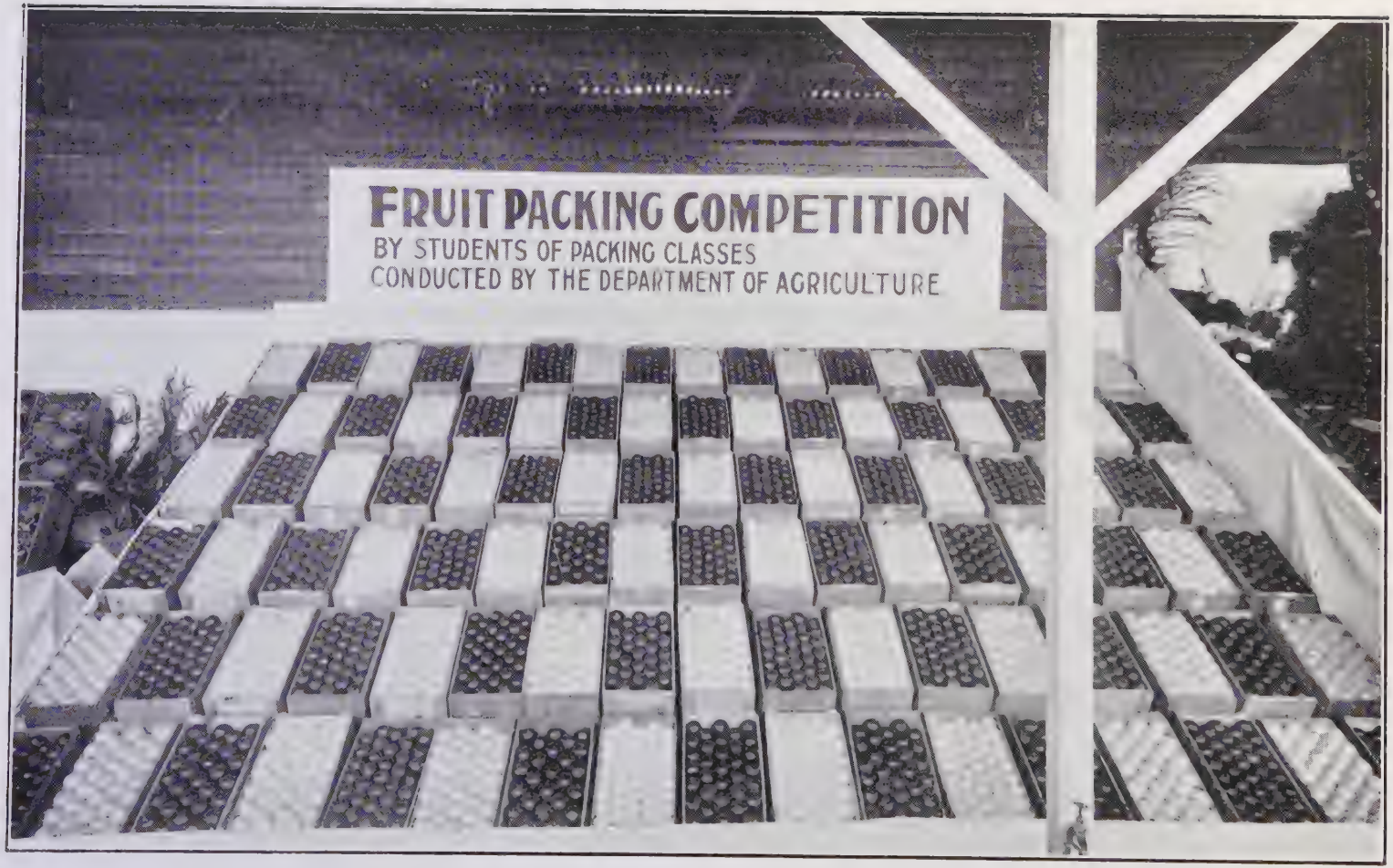


PLATE 71.—HOW QUEENSLAND FRUITS ARE PACKED.

Plate 72.—A Field Day on a Stanthorpe Soldiers' Settlement—Practical Lessons in Pruning.

Plate 73.—Ex-Diggers, who are doing well on Orchard Lands in the Granite Belt.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (21st September, 1923) from the Assistant to the Entomologist at Meringa (Mr. W. Cottrell-Dormer) on work detailed by the Entomologist in Charge to be carried out during his absence in August at the Pan-Pacific Science Congress.

Tachinid Flies.

Breeding work in this direction has been maintained, sticks with borers having been put in every day, or every second or third day, according to the number of flies counted. The lowest number counted was six on 20th, and until the number increased we devoted our attention more towards getting the Insectary well stocked with grubs. Soon, however, the count went up as follows:—27th, 20; 30th, 30; 31st, 40; 3rd September, 50; 6th, 60 to 70; and as the number grew the supply of borers was increased. At present we are putting in four sticks, about forty borers per day. On 29th August, there being a great number of flies emerging, we were threatened with a serious borer shortage, so I wrote to Mr. Peever, of Babinda, asking him to send bundles as before. Cane was then procured from Mr. Griffen, which was very suitable, as the sticks brought, though they had to be searched for, were badly infested, so now we have plenty of flies, plenty of borers for awhile at least, and good warm breeding weather. The greatest care and attention has been given to this important work, with the result that one small lizard and one small spider are the only enemies which have so far been detected in the cage. During your absence sixty-seven sticks have been put into the cage.

Asilid Larvæ.

There are two kinds of these larvæ at present breeding in the Insectary. They are designated in my descriptions as (A) and (B). There are one of A and thirteen of B at present feeding; others of A died—some of fungus, some inexplicably. The Asilids, Elaterids, and Carabids are all being brought up on frenchi grubs.

Elaterid Larvæ.

We have at present thirty-five of these larvæ feeding in the Insectary, some others have escaped, and one died. Most of these were obtained in company with frenchi in Mr. Beck's horse paddock—a field of weeds—which was being ploughed out.

Carabid Larvæ.

About eight of these were obtained, some injured, but all apparently of the same species; two at least have pupated. These pupæ are being kept aside for description and preservation.

Sulphur.

Earlier experiments were continued; grubs were put with food in soil containing known quantities of sulphur. Up to date no promising results have been obtained.

INTRODUCTION OF PARASITES FROM JAVA.

Batch No. 1.

This first lot of twelve cocoons of Javanese Digger-wasps arrived here on 5th September. They were packed in four tins, which contained cocoons of *Dielis tristis*, one cocoon of *Dielis grossa*, and other cocoons of *Triscolia rubiginosa*.

Diclis tristis.—This tin contained two cocoons, each wrapped in a cylinder of brass wire-gauze, one end being bent in and the other stopped with a small plug of cotton wool. One was a small cocoon and the other large. Both were very light. However, when the cocoon was moved about something could be heard inside the large one, but not in the small one.

Batch No. 2.

This second lot of cocoons of Javanese Digger-wasps arrived here on 7th September. The whole was as dry as could be, and the cocoons, although not showing any signs of mould, did not appear to be healthy, as they are far dryer and lighter than one would expect from a healthy cocoon. The six of *D. tristis* were put together in a large test tube with a wet cotton-wool stopper.

SCENOPINID LARVÆ. (?)

We have found these long active, many-segmented larvæ wherever we have found Tenebrionid larvæ (*Gonocephalum* sp.). One night I had one in a Petri dish with soil

and two or three of the beetle larvæ. Next morning the biggest of the latter was dead, and had a black mark on its side, apparently from a wound. It was healthy when put in dish. The dipterous larvæ has predaceous mouth parts, so it seems likely that it is predaceous on the larvæ of Gonocephalum. At present I have two or three in jars with Gonocephalum larvæ and growing potatoes. Two pupæ have been obtained, but both died from a fungus of some kind. Descriptions were taken of larvæ and pupæ, the latter varying a good deal in size.

Cosmopteryx.

Several efforts were made at breeding this moth and its parasites, and several methods employed, but so far only one moth—a new one—has been obtained. However, we have a good supply of larvæ and pupæ in fluid.

Gonocephalum.

Both beetles and larvæ are fairly plentiful among weeds in canefields. Female beetles were examined and found to be fertile, but the eggs were not yet mature. It is quite likely that these are laid one at a time or in small batches, as the beetle is apparently able to lay a great many eggs. If weeds be uprooted between cane rows the beetles will collect under them, and are thus quite easily obtained. I have had some in a cage for five weeks with food, shade, shelter, and soil, but have not yet obtained eggs. They are very fond of the cut surface of potato tubers and of carrot leaves and cabbage.

ORANGE-TREE BUG *(ONCOSCELIS SULCIVENTRIS).*

The Minister for Agriculture (the Hon. W. N. Gillies) has received from the Government Entomologist (Mr. Henry Tryon) the following report on investigations in connection with the occurrence of the Orange-Tree Bug (Oncoscelis) on the Blackall Range.

In a previous report, dealing with investigations being carried out by the Entomologist's Office with a view to controlling the Orange-tree Bug (*Oncoscelis sulciventris*) so locally prevalent there, and that had been deputed to the Assistant entomologist, Mr. A. A. Girault, it was pointed out that the best method of attack that presented itself appeared to be in efforts at the destruction of the insect when about five days after emergence from the eggs, as I had earlier discovered it transformed into a singular flat leaf-green object difficult of detection.

The bug then, as Mr. Girault had found, could, on banging the tree and its main branches, be brought to the ground, whereupon should the soil beneath it be free from weeds it would invariably crawl back to its trunk to regain its former feeding-grounds amongst the tender growth, and so could be effectively intercepted—say by the use of "tanglefoot" on the tree just above the soil surface; and it was pointed out that systematic concerted action on the part of citrus-growers along these lines would go far to banish its presence in the district.

The officer named has since 18th August been continuing his inquiries, and so testing the efficacy of various contact insecticides for the destruction of the insect by more direct means—that of spraying. In these experiments Mr. Girault has used lime-sulphur, Black Loaf 40, nicotex, kerosene emulsion and resin-kerosene emulsion, the last-mentioned being a tree-wash found the most effective of those tested by the late S. Voller, Instructor in Fruit Culture, and since recommended for the repression of the insect by Mr. A. H. Benson. Of these (except it) none gave any result in bug-destruction, notwithstanding, in the case of the kerosene emulsion, it was used as strong as one part in seven water in one part of the experiments. However, the resin-kerosene-emulsion spray-fluid as recommended only destroyed 50 per cent. of the young insects, whilst with the addition of less kerosene emulsion this percentage was reduced to 30 per cent. Several orange trees were comprised in each of these several tests. Hitherto the experiments had been conducted through the courtesy of Mr. H. Morris at his Birdwood orangery at Flaxton, and were rendered possible through his constant co-operation; but his own efforts long persisted in having so greatly reduced the pest there, is was decided to resume them at a spot near Montville, where the insects had apparently been permitted to breed up and where it was found they occurred in much larger numbers. Latterly, too, Mr. J. H. Simmonds, B.Sc., Entomological Assistant, had been detained to aid in the several undertakings.

At Montville, Mr. A. A. Girault continued spraying experiments, and also had an opportunity of testing the action of cyaniding in killing the young insects as ordinarily employed in destroying scale insects by fumigating. In this work he was assisted by the well-known citrus-grower V. G. Pack, who was perhaps the earliest

to use "tanglefoot" in capturing the young bugs following the Entomologist's indications. But the actual cyaniding was carried out by Mr. G. Williams and Mr. R. W. Peters, Instructors in Fruit Culture, acting under the direction of Mr. J. H. Ward of the Fruit Culture Branch.

In one series of four experiments with the cyanide of the strength usually recommended as by Mr. Benson, in which eight trees were used, with the exposures ranging from twenty-five minutes to sixty minutes, it was found that the entire population of young bugs was brought to the ground, and the bugs that afterwards succumbed ranged in number from 73 to 91 per cent. In another series, the trees received three other strengths of "cyanide," in addition to the one ordinarily prescribed, viz., 25 per cent., 50 per cent., and 75 per cent. increases in dosage, the exposures being thirty minutes for the first and twenty minutes for the strongest of the four. In the case of these the fatality reached 93 per cent.

With reference to these experiments with the use of cyanide, Mr. Girault found, strange to remark, that when the bugs on being brought down were kept under observation, in receptacles, all save a small percentage recovered. He therefore concludes that the fatality observed in the orangery is due to exposure (say to sun-heat) supervening on gassing.

The Montville experiments have also included one involving the use of additional contact insecticides in addition to further tests with the resin-kerosene compound mixture. The former have given negative results, the latter (six trees being used) effected the destruction of 24-38 per cent. Further tests are being made. Meanwhile, the insects are passing into a third phase in their life-history in which they are less vulnerable generally.

These investigations, which will be detailed in a special report by Mr. Girault, have indicated two methods by which the Orange Bug may be successfully controlled, each of which might be made to figure in any general concerted action, and such is urgently called for to prevent the infested orangeries proving a serious menace to those free from its presence or nearly so. They have also shown that the insect is to be attacked with greater likelihood of success during the winter and early spring months. Obviously, to treat several orangeries by the fumigation method will involve the possession of a number of gas-proof tents and a gang of men to operate, and the latter applies to some extent to banging the trees and cincturing the trees with "tanglefoot"; but since, apparently, there is not more than two broods of bugs during the year—generally it seems only one—general procedures of control on the lines indicated must be attended by far-reaching, long-continued benefit.

N.U.P.B.A. ACTIVITIES—BUTTERCUPS AND COMPINES.

At the last meeting of the National Utility Poultry Breeders' Association, Mr. W. F. Lloyd lectured on "Buttercups and Compines." The lecturer traced the origin and evolution of the Buttercup breed, claiming that they were a recognised breed long before the White Leghorn. To-day the American Buttercup Club numbers 1,000 members. The main points to breed for are:—Head, broad and deep; eye, full, round, and prominent; the comb, which gives the bird its name, is very hard to get correctly. It should be cup-shaped, with nice even serrations, fitting firmly on the skull. One spike, not over ¼ of an inch in length, is allowed in the centre. Shoulders and back should be broad, and breast full and carried well forward. Wings, large and well folded against the body; tail also large and well spread. The colour in the male should be a rich brilliant red; beak, dark, and eyes a reddish bay. Neck hackles should be a rich lustrous orange-red. Primary wing feathers should be black with the lower web bay. Breast and fluff bay; tail, black. In the hen, the ground colour should be a beautiful golden buff, barred regularly with black. The tail should be a dull black.

Besides being a very beautiful bird, the Buttercup holds a high position as a utility bird in America, as they have a very small appetite. The lecturer stressed the importance of this point in these days of high priced feeds. He claimed that 136 Buttercups can be fed on the same amount as 100 White Leghorns, and at the same time lay a full-sized marketable egg. Although only a light breed, their frames carry a surprising amount of meat, especially on the breast. In their first attempt at an egg-laying competition they scored 281 and 291 in twelve months.

The lecturer waxed very enthusiastic over the Compines, claiming that they are very hardy, and are the smallest eaters in the poultry world, eating even less than a bantam. Their great utility qualities, combined with their unique colouring, their stamina and sprightliness should win them a prominent place in poultry circles once they become known in Queensland.

Plate 74.—Mareeba's First Motor Lorry (R. Hampe) delivering W. Smallwood's Seed-Cotton at Mareeba Railway Station, July, 1923.

Plate 75.—First Load Seed-Cotton delivered at Mareeba Railway Station by Hastie Brothers, July, 1923.

PLATE 76.—TOMATOES SORTED READY FOR PACKING TO THE MARKET.
Grown by Ove Hansen, at Carbeen, near Mareeba, N. Q.

PLATE 77.—PUMPKINS GROWN BY OVE HANSEN ON HIS FARM AT CARBEEN, NEAR MAREEBA, N. Q. COTTON GROWING IN THE BACKGROUND.

Plate 78.—"Windermere Bay Kennedy," Champion Draught Stallion, Royal National Exhibition, Brisbane, 1923.

Plate 79.—"Beryl," Champion Draught Mare, Royal National Exhibition, Brisbane, 1923.

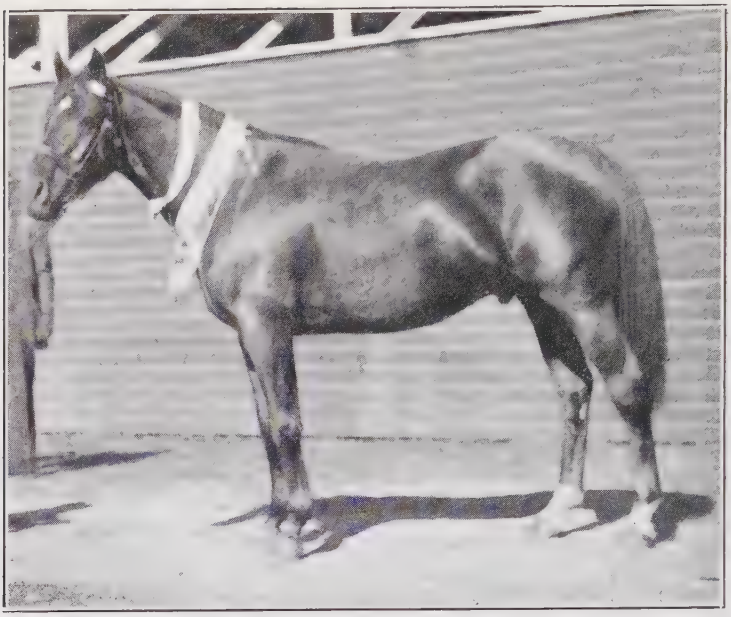


Plate 80.—"Polybius," Champion Blood Stallion, Royal National Exhibition, Brisbane, 1923.

Plate 81.—Judging Ayrshires, Brisbane Show, 1923.

Plate 82.—Judging Illawarras, Brisbane Show, 1923.

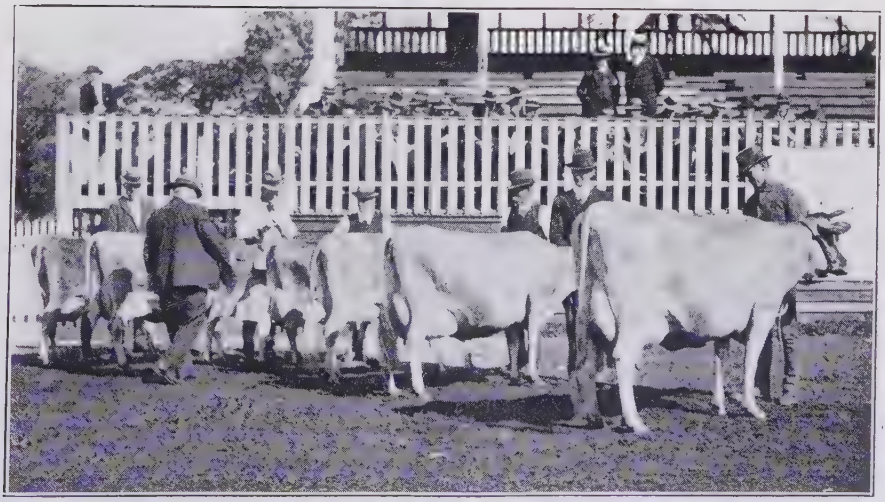


Plate 83.—Judging Jerseys, Brisbane Show, 1923.

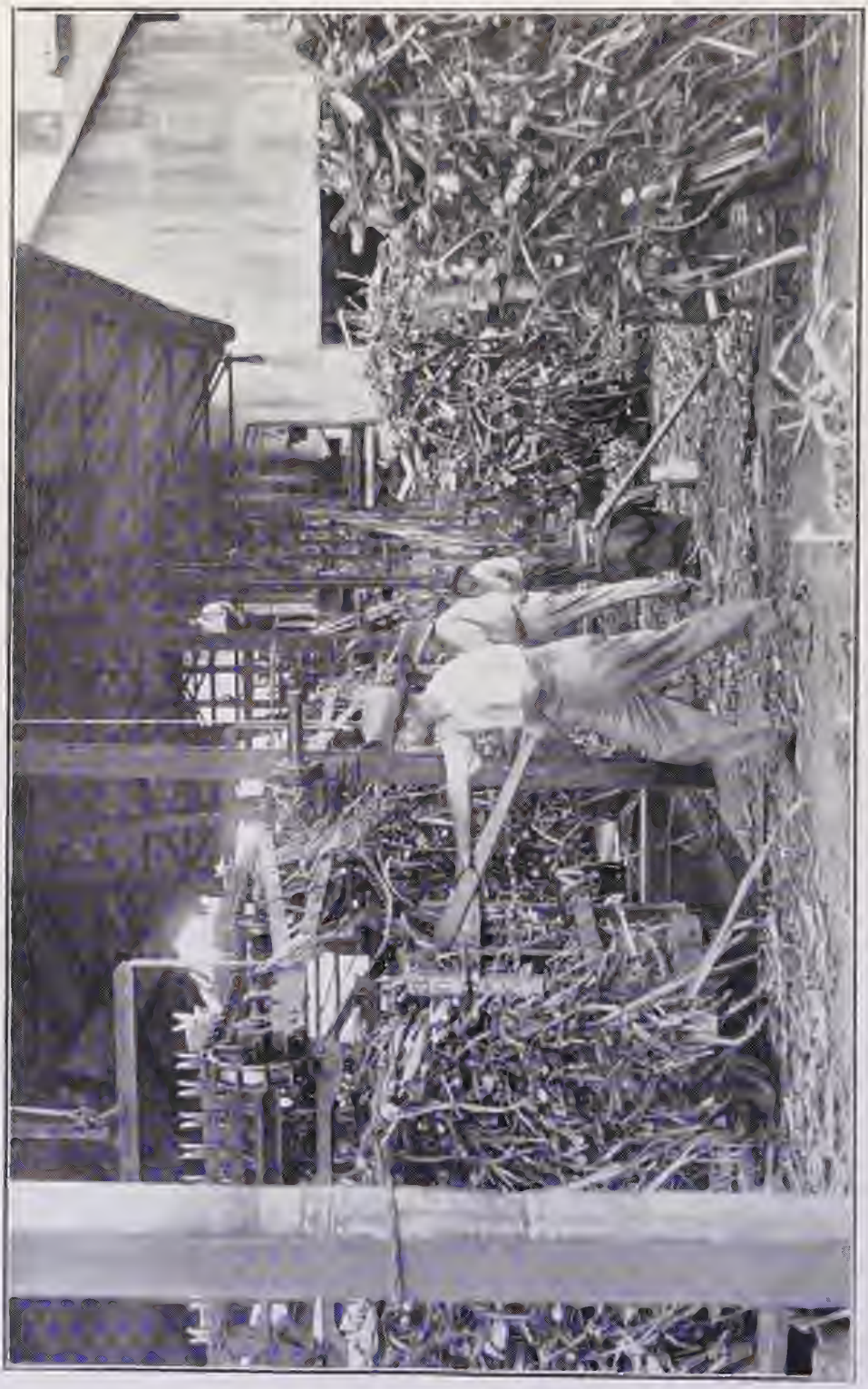


PLATE 84.—FEEDING CANE THROUGH SOUTH

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—X.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. This is the concluding instalment and the whole summary will shortly be published in bulletin form.—Ed.

MISCELLANEOUS.

Summarised by George R. Patten, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following tables contain some interesting analyses of green manures, sisal hemp, &c., experiment to determine the preserving action of different chemicals upon cane juices, comparative results of analyses made at Racecourse Mill, Mackay, with analyses of juice expressed by the Laboratory Mill at the Sugar Experiment Station, Mackay, from the same varieties of cane, and tests to determine the effect on the quality of the juice by increasing the extraction.

Certain green manures grown at the Bundaberg Sugar Experiment Station were the subject of analyses in the Brisbane Laboratory. The results appear hereunder :—

Analyses.

Laboratory No.	Variety.	Analyses of Dry Material.						
		Moisture.	Organic Matter.	Ash.	Nitrogen.	Phosphoric Acid.	Lime.	Potash
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
148	No. 1 Mauritius Bean	11·11	75·43	13·46	2·248	·52	4·14	1·84
149	No. 2 Mauritius Bean	9·76	78·87	11·37	1·492	·62	3·21	2·46
150	Jerusalem Pea ..	10·98	78·21	10·81	1·730	·42	2·77	1·73
		Analyses of Green Material.						
148	No. 1 Mauritius Bean	77·8	18·84	3·36	·562	·130	1·035	·460
149	No. 2 Mauritius Bean	78·3	18·96	2·74	·360	·149	·774	·592
150	Jerusalem Pea ..	80·0	17·58	2·42	·388	·094	·622	·388

Yield per Acre.

Laboratory No.	Variety.	Tons per Acre.		Lb. per Acre.			
		Total Crop.	Organic Matter.	Nitrogen.	Phosphoric Acid.	Lime.	Potash.
148	No. 1 Mauritius Bean	13·69	2·58	173	40	317	141
149	No. 2 Mauritius Bean	14·22	2·70	115	47	246	189
150	Jerusalem Pea	12·90	2·67	112	27	180	112

From these analyses it will be seen that the Mauritius bean is superior as a fertiliser to the Jerusalem pea.

In the Mackay district, in which the sensitive plant is very common, it has frequently been remarked that where a heavy crop of this plant has been ploughed under a good crop of cane usually follows. Analysis of the sensitive plant have recently been carried out at the Station, while at the same time a new plant stated to be useful as a green manure crop—viz., Mungo Bean—was also analysed. The following table has been prepared by the Mackay Laboratory.

Analyses of Mungo Bean and Sensitive Plant.

Substance.	Moisture	Nitrogen in Green Material.	Ash.	Analysis of Ash.			Calculated on Green Material.		
				Lime.	Potash.	Phosphoric Acid.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Mungo Bean ..	74·892	·4194	10·321	14·511	5·887	1·064	1·405	·569	·1031
Sensitive Plant .. (Mimosa Sensitiva)	61·384	·8240	6·721	6·721	10·276	·7188	2·370	1·527	·1069

Substance.	Calculated in Pounds per Acre on a 15-Ton Crop Basis.				Equivalent to a Manure Dressing of—			
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Sulphate of Potash.	Superphosphates.	Sulphate of Ammonia.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Mungo Bean ..	472·08	191·18	34·64	140·91	472·08	382·36	207·84	704·55
Sensitive Plant .. (Mimosa Sensitiva)	796·32	513·07	35·91	276·86	796·32	1026·14	215·46	1384·20

It will be noticed in the above that the percentage of nitrogen is considerably more in the sensitive plant than it is in the Mungo Bean, while the other constituents, such as lime, potash, and phosphoric acid, calculated on green material, are also higher. It is of course not suggested that the sensitive plant or mimosa should be specially grown for green manuring purposes, but those cane farmers who have paddocks overrun with it would probably find the ploughing under of this would materially benefit their land, and enable good cane crops to be realised.

ANALYSIS OF SAWDUST.

Three samples of sawdust were received for analysis with the object of obtaining their value as fertilisers. The results, which are given below, show that, calculated roughly on their unit values, they would only be worth about 5s. per ton, and therefore of little value chemically, though possibly of slightly greater value than this on account of their mechanical effects in restoring humus to the soil. This, however, would not compare with the results of the ploughing-in of a green crop.

Analyses of Sawdusts, May, 1910.

Constituent.	1	2	3
	Sawdust 3 Years Old.	Sawdust 5 Yerrs Old.	Sawdust over 10 Years.
Mositure	72·155	68·230	73·286
Volatile and organic	26·388	28·730	23·731
Phosphoric acid	·048	·198	·049
Lime	·360	·710	·367
Potash	·037	·061	·077
Nitrogen	·208	·298	·180

SISAL HEMP ANALYSES.

The analyses of the dry substance of the sisal hemp shows that that crop takes up from the soil a relatively high proportion of mineral matter. It is further shown, however, that the great bulk of the mineral matter is composed of soil elements of the commonest and most abundant character, such as lime and magnesia, and that the elements usually purchased, in the form of manures, are drawn upon by the crop in a relatively small measure. The high content of lime and magnesia, in the ash of the sisal, at once explains why the plant flourishes so well upon soils having a coal or limestone subsoil; such, for example, as the sea-level soils of the Hawaiian Islands, where the sisal hemp is considerably developing. There is no doubt, in the opinion of growers, that a good supply of lime and related constituents has a good effect upon the nature of the fibre, as well as upon the rate of growth of the plant.

Analysis of Sisal Hemp grown at the Experiment Station, Mackay.

	Green Substance.	Dry Substance.
Moisture	86·70	00·000
Dry Substance	13·30	100·000
Crude Fibre	2·825	21·240
Total Ash	1·574	11·840
Insol. Ash	·037	·280

Ash Constituents.

Sand	·560
Carbon Dioxide	26·430
Soluble Silica	·808
Phosphoric Acid	4·604
Lime	31·860
Magnesia	21·310
Ferric Oxide	·800
Manganese Oxide	·000
Sulphur Trioxide	1·448
Chlorine	1·040
Potash	7·997
Soda	2·674
	99·531

Experiments to Determine the Preserving Action of Different Chemicals upon Cane Juice.

Original Analysis.	Lead Acetate.			Mercuric Chloride.			Formalin.		
	After 16 hours.	After 40 hours.	After 72 hours.	After 16 hours.	After 40 hours.	After 72 hours.	After 16 hours.	After 40 hours.	After 72 hours.
Per Cent.									
Brix, 19·410	..	..	..	19·380	19·330	19·320	19·380	19·360	19·320
Sucrose, 18·157	18·321	18·239	18·232	18·163	18·183	18·135	17·960	17·892	17·829
Glucose, ·249	·253	·250	·250	·253	·265	·277	·285	·322	·323
Purity, 93·590	..	..	..	93·820	94·060	93·960	92·670	92·410	92·280

Note.—The above figures show the preserving action of lead acetate, mercuric chloride, and formalin. The results individually, and in average, indicate conclusively that mercuric chloride is the most effective. These results relate exclusively to preservation, and not to the clarification of juice for analysis. Lead acetate was applied as a preservative at the rate of 4 c.c. to 100 c.c. of juice; mercuric chloride at the rate of ·01 gramme to 100 c.c. of juice; and formalin at the rate of 1 c.c. to 100 c.c. of juice.

COMPARATIVE RESULTS OF ANALYSES MADE AT RACECOURSE MILL WITH ANALYSES OF JUICE EXPRESSED BY THE LABORATORY MILL AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM THE SAME VARIETIES OF CANE.

In order to get some information as to the average difference between the juice expressed at the first rollers of a large sugar mill and juice expressed by a laboratory mill from the same varieties of cane, a large number of samples have been compared. The laboratory mill at this station is a powerful one, having rollers of $6\frac{3}{4}$ inches diameter, which can be adjusted to crush light or heavy. The analyses given in the accompanying table under laboratory mill results are the final analyses made on the experiment varieties under test. The samples varied in weight from about 28 lb. to 150 lb. of cane, and were only passed through the rollers once. The probable extraction would be between 25 per cent. and 35 per cent.; by crushing the cane twice an extraction of 51 per cent. can be obtained, and the maximum is approximately 72 per cent., which was obtained by passing the cane through five or six times. The samples taken at Racecourse Mill were from the same varieties off the same divisions of land. The cane was harvested, and the analyses were made at Racecourse Mill within about five days of the time the tests were made at the station. The greatest difference between any two results is 1·74 C.C.S., and no other differences exceeded 1·0 per cent. These wide variations are, no doubt, due to slight differences of sample, and the same applies to the four instances where the mill results are slightly higher than the laboratory results. The average difference of thirty-four samples is ·47 per cent., and this completely bears out the previous experiments as published in the 1920 report, where the same canes were crushed six times and each sample of juice collected and analysed separately. The 1920 experiment showed that the cane juice does not vary greatly with increased extraction, and the true average c.c.s. was only slightly lower than that of the first juice expressed. It should also be noted that in the 1920 experiments the extractions of the final crushings and the weight of juice expressed were low as compared with the total juice.

COMPARATIVE RESULTS OF ANALYSES MADE AT RACECOURSE MILL, WITH ANALYSES MADE OF JUICE EXPRESSED BY LABORATORY MILL FROM THE SAME VARIETIES OF CANE.

Variety	Laboratory Mill Results.				Racecourse Mill Results.				Difference in C.C.S.
	Per cent. Total Solids (Brix).	Per cent. Sucrose in Juice.	Per cent. C.C.S. in Cane.	Purity of Juice.	Per cent. Total Solids (Brix).	Per cent. Sucrose in Juice.	Per cent. C.C.S. in Cane.	Purity of Juice.	
Q. 970 (first ratoons) ..	21·9	20·61	16·15	94·1	21·1	20·05	15·8	95·0	·35
Q. 970 (first ratoons) ..	21·7	20·50	16·10	94·5	21·4	19·75	15·3	92·3	·80
Q. 970 (first ratoons) ..	21·6	20·23	15·81	93·6	21·0	20·0	15·78	95·2	·03
Q. 970 (first ratoons) ..	21·9	20·26	15·72	92·5	21·2	19·85	15·47	93·6	·25
Q. 1098 (plant) ..	19·5	18·21	14·56	93·4	19·0	17·48	13·85	92·0	·71
7 R. 428 (plant) ..	19·1	17·58	13·95	92·0	18·8	17·19	13·57	91·4	·38
Q. 1121 (plant) ..	19·6	18·47	14·84	94·2	19·9	18·5	14·75	92·9	·09
Q. 813 (plant)	21·3	19·97	15·81	93·7	21·1	19·74	15·60	93·5	·21
N.G. 24A (Goru) ..	19·6	18·13	14·68	92·5	20·2	18·44	14·3	91·3	·38
Shahjahanpur	20·6	19·37	14·22	94·0	20·9	19·11	13·79	91·4	·43
H.Q. 77 (plant) ..	19·6	18·61	14·93	94·9	19·7	18·27	14·55	92·8	·38
M. 168^{04} (plant) ..	18·4	16·84	13·3	91·5	18·5	16·48	12·71	89·1	·59
Java E.K. 28 (plant) ..	20·8	19·89	15·83	95·6	22·4	20·25	15·58	90·4	·25
Java E.K. 2 (plant) ..	16·8	14·71	11·03	87·5	18·0	15·45	11·44	85·8	·31 higher
Java E.K. 1 (plant) ..	18·6	16·87	12·86	90·7	18·3	17·12	13·26	93·5	·40 higher
Java 247 (plant) ..	18·8	18·0	13·67	95·7	19·3	17·55	12·9	90·9	·77
Java 100 Bont (plant)	17·8	15·95	12·22	89·6	18·5	16·03	12·0	86·6	·22
H. 109 (plant)	19·3	18·64	14·73	96·5	20·75	19·26	14·88	93·0	·15 higher
H. 146 (plant)	19·5	18·61	14·97	95·4	20·2	18·10	14·05	89·6	·92
H. 227 (plant)	19·7	18·61	14·89	94·4	20·0	17·97	14·13	89·8	·76
D. 1457 (first ratoons)	21·2	20·01	16·48	94·4	21·8	19·69	15·78	90·3	·70
D. 109 (first ratoons) ..	19·2	18·11	14·47	94·3	18·9	16·64	12·73	88·0	1·74
B. 4596 (first ratoons)	17·5	16·19	12·49	92·5	17·8	16·01	12·12	90·0	·37
B. 6450 (first ratoons)	20·4	19·63	15·58	96·2	20·4	19·44	15·33	95·3	·25
Gingor (first ratoons) ..	20·3	19·36	15·76	95·3	..	..	15·05	..	·71
7 R. 428 (first ratoons)	20·2	18·62	14·6	92·2	..	..	14·40	..	·20
H.Q. 458 (first ratoons)	19·9	18·59	15·13	93·4	..	..	15·65	..	·52 higher
Q. 813 (first ratoons) ..	21·8	21·1	17·0	96·8	..	..	16·0	..	1·0
Q. 903 (first ratoons) ..	20·5	19·74	15·67	96·3	..	..	14·9	..	·77
Q. 1098 (first ratoons)	20·6	19·59	15·54	95·1	..	..	14·6	..	·94
Q. 1121 (first ratoons)	20·7	20·03	15·94	96·7	..	..	15·2	..	·74
Q. 970 (first ratoons) ..	21·3	20·41	16·26	96·1	..	..	15·7	..	·56
N.G. 24B Goru (second ratoons)	20·4	19·26	15·50	94·4	..	..	14·8	..	·70
N.G. 24B Goru (second ratoons	21·4	19·92	15·61	93·0	..	..	14·8	..	·81
Average C.C.S. 34 samples ..	..	..	14·88	..	Average	C.C.S.	14·41	Average	·47

Tests to Determine the Effect on the Quality of Juice by increasing the Extraction.

Variety of Cane.	Percentage of Juice Expressed on 100 of Juice.		Total Solids (Brix).	Per cent. Sucrose in Juice	C.C.S. in Cane.	Purity of Juice.
N.G. 24B (Plant)	First crushing ..	16·09	19·3	17·74	14·06	91·9
Ditto	Second crushing ..	24·42	19·1	17·52	13·86	91·7
Ditto	Third crushing ..	14·37	19·2	17·63	13·95	91·8
Ditto	Fourth crushing ..	8·62	19·8	18·20	14·41	91·9
Ditto	Fifth crushing ..	5·75	19·6	17·30	13·37	88·3
Ditto	Sixth crushing ..	1·15	20·3	17·70	13·57	87·2
Total Extraction		70·40	..	..	..	..
True Average C.C.S. in Cane		..	..	..	13·95	..
N.G. 24A (First Ratoons) ..	First crushing ..	5·21	20·3	18·99	15·02	93·5
Ditto	Second crushing ..	19·03	19·9	18·77	14·90	94·3
Ditto	Third crushing ..	19·03	19·9	18·75	14·89	94·2
Ditto	Fourth crushing ..	14·60	19·8	18·65	14·80	94·2
Ditto	Fifth crushing ..	10·69	20·4	18·88	14·84	92·5
Ditto	Sixth crushing ..	3·12	20·4	18·72	14·63	91·8
Total Extraction		71·68	..	..	..	..
True Average C.C.S. in Cane		..	..	..	14·86	..
H.Q. 426 (First Ratoons) ..	First crushing ..	5·66	21·6	20·26	16·23	93·7
Ditto	Second crushing ..	10·86	21·1	19·52	15·52	92·5
Ditto	Third crushing ..	16·98	21·1	19·49	15·48	92·4
Ditto	Fourth crushing ..	12·27	21·0	19·41	15·42	92·4
Ditto	Fifth crushing ..	6·61	21·2	19·41	15·34	91·5
Ditto	Sixth crushing ..	5·66	21·6	19·66	15·48	91·0
Total Extraction		58·04	..	..	..	..
True Average C.C.S. in Cane		..	..	..	15·53	..

Mr. Keogh, chemist in charge of the Mackay Station, comments :—In the preceding tables the percentage of juice expressed is the amount expressed at each crushing. In the first crushing the rollers were well opened and the cane only lightly cracked ; the second crushing the rollers were screwed down lower and the cane crushed lightly ; the third time the rollers were screwed well down and the cane got a good crushing ; the fourth time the rollers were almost down as far as possible ; the fifth, the rollers were the same as the previous time, but the cane was put through one stick on top of another ; and the final crushing the rollers were screwed down as far as possible, and two sticks were put through at a time one on top of another. In the first and second tables the extraction is shown as 70·4 and 71·68 respectively, in each case no more juice could be expressed, and the maximum extraction on the laboratory rollers was obtained without maceration. At each crushing the juice was weighed, well mixed, and a sample taken for analysis. With the Clark's Seedling, the extraction obtained was not very high ; owing to the brittle nature of the cane it broke up into very small pieces. It will be noticed that the juice from the first three crushings is only slightly higher than the true average c.c.s., and that from the final crushings is slightly lower. For the first sample 97 lb. of cane were taken, the second sample 54¼ lb., and the third sample 59½ lb. of cane.

2. The second experiment was the comparison of the analysis of laboratory mill juice with juice from the same variety and field crushed by the first mill of a large sugar factory.

Further Comparative Results of Analyses of Juice from Laboratory Mill and Juice from First Mill of Sugar Factory.

Variety of Cane.	Laboratory Mill Results.				First Rollers of Sugar Mill.			
	Total Soluble Solids (Brix).	Sucrose in Juice.	Quotient of Purity.	C.C.S. in Cane.	Total Soluble Solids (Brix).	Sucrose in Juice.	Quotient of Purity.	C.C.S. in Cane.
Q. 1092 (Plant)	18·7	16·37	87·5	12·59	18·6	16·27	87·4	12·48
H.Q. 458 (Plant)	18·9	16·61	87·8	12·80	19·17	17·13	89·3	13·37
H.Q. 458 (First Ratoons)	19·4	17·38	89·6	13·55	20·06	17·56	87·5	13·50
Q. 1121 (First Ratoons) ..	20·0	18·61	93·0	14·80	19·17	17·40	90·7	13·70
N.G. 24B (Plant—Goru) ..	19·2	17·63	91·8	13·95	19·47	17·37	89·2	13·51
Average C.C.S. ..	..	..	..	13·54	Average C.C.S. ..	..	..	13·31

In the above tests the cane for the laboratory sample was picked from the field after the cane was cut for sending to the mill. In all cases twenty average-sized

sticks were selected, and the cane passed through the rollers twice ; the first crushing was light, and in the second the rollers were screwed well down ; the crushings as given to these samples would express about 40 per cent. of the juice : the maximum extraction obtainable on this small mill is approximately 72 per cent. ; this was determined by actual tests in another set of experiments.

The tests of the sugar-mill were made on the same varieties and on the same cane from which the small samples of twenty sticks were selected. The cane was loaded into wagons after the small samples were selected, and then sent to Racecourse Mill, where the wagon loads were passed through the first rollers and the samples taken for comparison.

[The End.]

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August, in the Agricultural Districts, together with Total Rainfalls during August, 1923 and 1922, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.,	No. of Years' Records.	Aug., 1923.	Aug., 1922.		Aug.,	No. of Years' Records.	Aug., 1923.	Aug., 1922.
North Coast.	In.		In.	In.	*South Coast*—continued :	In.		In.	In.
Atherton	0·86	22	0·20	0·13					
Cairns	1·78	41	0·76	0·54	Nambour	1·99	27	1·29	0·77
Cardwell	1·32	51	1·21	0·18	Nanango	1·45	41	0·56	0·58
Cooktown	1·37	47	0·14	0·24	Rockhampton ...	0·90	52	0·21	0·73
Herberton	0·68	36	0·25	0·12	Woodford	1·86	36	0·90	0·58
Ingham	1·40	31	2·20	0·10					
Innisfail	5·28	42	3·35	1·53					
Mossman	1·33	15	0·28	0·85					
Townsville	0·47	52	1·69	...	*Darling Downs.*				
					Dalby	1·24	53	0·35	0·36
Central Coast.					Emu Vale	1·20	27	0·85	0·46
					Jimbour	1·30	35	0·30	0·35
Ayr	0·54	36	1·02	...	Miles	1·21	38	0·33	..
Bowen	0·71	52	0·51	...	Stanthorpe ...	1·85	50	0·25	0·54
Charters Towers ...	0·53	41	1·12	...	Toowoomba ...	1·77	51	0·59	0·49
Mackay	1·06	52	1·22	0·02	Warwick	1·56	58	1·08	0·50
Proserpine	1·36	20	1·36	...					
St. Lawrence ...	0·91	52	0·88	...					
					Maranoa.				
South Coast.									
					Roma	0·97	49	0·02	...
Biggenden	1·20	24	0·15	0·49					
Bundaberg	1·40	40	0·80	1·10					
Brisbane	2·12	72	0·70	0·16	*State Farms, &c.*				
Childers	1·33	28	0·26	2·03					
Crohamhurst ...	2·32	30	1·35	1·18	Bungeworgorai ...	0·89	9	0·01	...
Esk	1·59	36	0·41	0·52	Gatton College ...	1.21	24	0·39	0·21
Gayndah	1·25	52	0·32	0·51	Gindie	0·79	24	1·67	...
Gympie	1·85	53	0.83	0·15	Hermitage ...	1·40	17	0·55	0·49
Glasshouse Mts. ...	1·61	15	*	0·87	Kairi	1·09	9	0·48	0.18
Kilkivan	1·58	44	0·37	0·71	Sugar Experiment Station, Mackay	0·95	26	0·90	0·05
Maryborough ...	1·73	52	0·76	0·45	Warren	1·10	9	0·12	0·60

* Return not received.

Note.—The averages have been compiled from official data during the periods indicated; but the totals for August this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Government Meteorologist..

SUGAR: FIELD REPORTS.

The Northern Field Assistant to the Bureau of Sugar Experiment Stations reports (20th September, 1923) to the Director, Mr. H. T. Easterby, as follows:—

Mossman.

Messrs. Crees Brothers' Farm.—The canes analysed were twelve months old, and the samples taken were from single, although not picked, sticks.

Variety.	Length.	Weight.	Per cent. C.C.S.	Lbs. C.C.S. in Stick.	Tons Cane per Ton, Sugar.
	Ft. in.	Lbs.			
H.Q. 458	10 0	10	12·88	1·288	8·62
D. 1135	10 0	5	8·42	..	..
H.Q. 1	6 6	6½	11·40	·7410	9·74
Nanemo	6 0	3½	16·70	·5845	6·65
H. 109	10 0	6	12·03	·7218	9·23
Badila	5 3	6	16·70	1·002	6·65
Q. 903	7 0	5	15·20	·760	7·30
E.K. 28	9 0	6¾	14·97	1·0105	7·42
E.K. 1	12 3	8	11·63	·9304	9·54
Oramboo	7 3	5½	16·57	·9113	6·69
B. 147	7 0	7	13·23	·9261	8·39

When the samples were taken very little arrowing had developed. Probably the density will further improve when the final analysis is taken at cutting time.

Cairns.

The very dry conditions so lately prevailing here changed for the better to a small extent on the 18th August, when showers varying from very light at Redlynch and Freshwater to half an inch in Cairns, and increasing to about 2 inches in the Babinda areas were experienced. Although these are small amounts, they will be of much benefit, helping ratooning and planting operations, besides freshening up the pasturage in the area.

Proserpine.

In this centre extremely cold and dry conditions were experienced during the past winter. Rainfall up to the end of August amounted to only 23.25 inches, as against the average annual fall of over 76 inches. Severe frosts were also recorded. The mill was working satisfactorily. Owing to the dry weather and then the frost, density was under the average and fluctuations were more marked than usual. The tramline (about 6 miles in length) connecting the Banana Pocket with the Government railway at Thompson's Creek was finished and was being used by local growers. At present it is a horse line, but with the full area under crop a locomotive will probably be employed.

The cane in general looked very well and rather freer from frost effects than most of the other areas visited. Some extremely good Goru (N.G.24, 24A, and 24B), Badila, and Q.813 were noticed. Some 200 acres of land should be supplying the mill in 1924.

Cannon Valley, Strathdickie, and Saltwater did not show the effects of the frost nearly as much as the area nearer the township, and some very fine cane was seen around these centres, practically untouched by frost. D.1135 and Q.813 seem to have stood the frost better than the other varieties.

New Areas.— One of these is Bloomsbury, on the Mackay Railway Line, where some 60 acres of good land will be under crop for next year. Nearer the mill and upon land situated, say, roughly, between Myrtle Creek, the river, and Foxdale, several new blocks have also been planted.

Throughout all the Proserpine area a large acreage of land is now under cane, and, despite the dry conditions, a fair strike seems assured. As a whole, conditions in this district are improving rapidly. Cultivation methods are sound, and fertilising is being carried out to a large extent. Lime has been successfully used by several of the growers. Quite a number of soil analyses were sent away to the Sugar Bureau lately, and the senders intend following out the advice given.

Four or five new tractors are in use, and several more are on order. As usual, growers using them speak very highly of the time and labour saved.

Quite a number of new houses were noticed in and adjacent to the town, and, as the latter is now connected with various outlying parts of the area by really good roads, it looks as if the advent of the through line from Mackay and the return of good seasons will make Proserpine a busy centre.

Bowen.

This district was also suffering from a very dry time. Up to the end of August the rain registration amounted to only 7.89 inches, as against the average rainfall of 40 inches. Naturally crop conditions have been bad, and in nearly all cases the cane being harvested has been irrigated by small plants not big enough to keep up the water supply needed by growing cane, especially when the ground has not had a soaking for such a very long period. Considering this it is really remarkable that the cane going into the mill is as good as it is. Among the cane being cut was noticed very good N.G.24 and N.G.24B (Red and Green Goru), Badila, Q.855, Q.813, and D.1135. Some of the Q.855 were first ratoons and looked really good.

Several growers have limed and fertilised their fields.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 29th August, 1923:—

Mulgrave.

Among some of the newer cane areas is that known as the Little Mulgrave. This locality shows much progress since my last visit. Further areas are being fallen. The Main Roads Board are now engaged on the road to connect with the Tableland, and much traffic is now to be seen upon the road known as the Packers' Track.

A new and important innovation in connection with this increased traffic is a particularly fine 5-ton motor lorry, which negotiates the very broken and hilly country over which the road goes quite easily. On the morning of my visit three large sawmill logs containing probably about 1,500 superficial feet were delivered in Gordonvale at 8.30 a.m. After delivering same and loading with eighteen casks of cement and other goods, it overtook me 5 miles from Gordonvale at 10.15 a.m. When one sees the great ease and rapidity with which it negotiates such roads, it makes the idea of motor trollies rather attractive for cane harvesting where rails are not in use.

Another new cane area for the Mulgrave Mill is on the Mulgrave River. It contains from 250 to 350 acres of first-class deep alluvial flats; planted upon it are some 230 acres carrying a heavy crop of Badila. Messrs. Jackson and Company, the owners of this property, have spent about £1,000 in constructing a very fine bridge, 320 feet in length, across the river over which the locomotives run, and they are now building two more smaller ones to take locomotive traffic across deep gullies in their cane paddocks. Messrs. Jackson and Company have about 110 acres under the plough. Of this, some September plant shows about 4 feet of solid cane, whilst the twelve months' old plant is cutting at about 35 to 40 tons per acre. As a canegrowing proposition the property is an excellent one. New farms are also being opened up between the mill and the packers' camp. Here there are some 24 acres (D.1135) planted last September and manured with about 6 cwt. mixed manure. Despite its being forest land and the very dry season, the paddock should cut at the rate of at least 25 tons per acre.

Diseases and Pests.—Symptoms of "leaf scald" were observed, principally in H.Q.426 (Clark's Seedling), Green Goru (24B), and also in Badila. D.1135 so far seems resistant. Probably the very dry weather conditions now being experienced are partly responsible.

Advantage was taken of Mr. McBryde's (mill chemist) courtesy to inspect the experimental plot at the mill that he has initiated in connection with this disease. Mr. McBryde has taken a great deal of trouble, and his experiments are very interesting, although only a couple of months old. The ground chosen has been well worked and watered when necessary. When inspected the conditions were good for growth, the soil being loose, moist, and fairly warm.

In the plot are healthy picked plants, plants from healthy looking sticks but from slightly affected stools, plants taken from sticks showing slight signs of disease, and plants inoculated by being placed in contact with diseased sets. The canes chosen were H.Q.426, N.G.15, 7 R.428, and D.1135.

Of these plants the first mentioned (*i.e.*, the picked ones) appear splendidly green and healthy looking, and compare more than favourably with outside plants

put in at the same time, but the majority of all the others show symptoms of the disease in a more or less marked extent. The experiment as an object lesson is well worth studying by local growers. Although grubs have done a certain amount of damage this year, the dry weather must also be allowed for, and it is probable that the direct grub damage this season is considerably less than last year. The experiments with para-dichlor. now being conducted by Mr. Jarvis are most promising.

Hambledon.

A certain amount of "yellowing" of the tops is very noticeable amongst the cane, more especially in the Badila.

Among different parts of the area Freshwater certainly shows most promise. Considering how very dry the weather has been, some very fine cane (Badila) twelve months old was seen in several places, and a return of 40 tons per acre was fairly usual. The first ratoons were also cutting very well. Messrs. McManis and Painter have some 110 acres for this year, and hope to increase this amount largely for next year. These growers are developing their area in a very large way. Further up the creek some fine cane was seen at Messrs. O'Hara's and several other places.

Diseases.—The conditions of the Hambledon crop are somewhat similar to those of the Mulgrave area. Leaf scald was noticed in a number of places, and rather to a larger extent on the newer and richer lands.

Grubs.—Although probably the total amount of damage caused by grubs this year is less than other years, yet in individual places the loss has been very severe, notably from, say, north of Mr. G. Hing's farm to the Freshwater Gap.

New Varieties.—Mr. F. C. Curlewis gave some interesting figures from an experimental paddock on his farm. This land has been under cane for a very large number of years, and this year the particular plot was grub-affected.

Year 1922.		Year 1923. 14 Months old.			
11 Months Old.	C.C.S.	No. of Sticks.	Average Length.	Average Weight.	C.C.S.
			Ft. in.	Lb.	
E.K. 28	14·09	4	8 0	8	15·1
Badila	..	3	5 8	6	15·1
H. 109	11·56	4	8 7	8	13·0
Q. 695	10·91	3	6 2	6	12·1

Other canes planted in the same block were M.16804, H.Q.77, H.Q.458, and Oba Badila, but the canes listed above gave the best results.

Mr. Curlewis is planting out a large area of E.K.28 for next year, as he considers that its tonnage per acre in such an unfavourable year, its high sugar content, and its comparative freedom from grubs in this case make it a good cane to try out on a larger scale.

Mossman.

Very dry weather conditions were also in force in this area. The mill had just started, the density being very fair. The supply was being well maintained, and with the exception of dry conditions everything looked promising for a successful season.

A large cropping of young plant was noticed throughout the district, and, considering the lack of moisture, it looked remarkably well. In this respect Messrs. Pringle Brothers and Mr. G. Muntz have really good blocks.

Respecting the newer varieties, some very interesting work has been carried out by Messrs. Crees Brothers, as follows:—

Cane Twelve Months Old.

E.K.28—Erect nature, good stools and length of cane, cutting probably 40 tons to the acre.

E.K.1—Very heavy crop, some sticks up to 13 feet in length, but rather inclined to lie down. Very healthy-looking.

Q.903—Very good stools and length of cane; will cut fairly well.

H.Q.458—Very heavy sticks, medium number of same.

H.109—Thin, long, and straggly-looking and showing signs of leaf disease. Would not advise planting out same.

THE WANGANELLA TYPE OF SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

The greatest asset of Australia to-day is the pastoral industry, returning forty-six millions of pounds sterling every year in wool values alone. The greatest asset again to the sheepbreeder and the woolgrower is the "Wanganella" type of sheep. This type is now to be found in all parts of Australia where hardiness under almost any conditions of climate is desired. Besides, they give a fleece which for quality, weight, and value per head is not excelled, if equalled, by any other breed in the world. South African breeders are raising the value of their flocks by means, almost exclusively, of the use of this blood. They have paid as high as 4,000 guineas for Australian rams. A most instructive set of pictures, reproduced from the "New Zealand Farmer," appears in the issue of the "Stock and Station Journal" of 1st August, and are reproduced here.

The first two plates are those of direct lineal descendants of the first merino flock established at Camden Park, New South Wales. They have been kept pure.

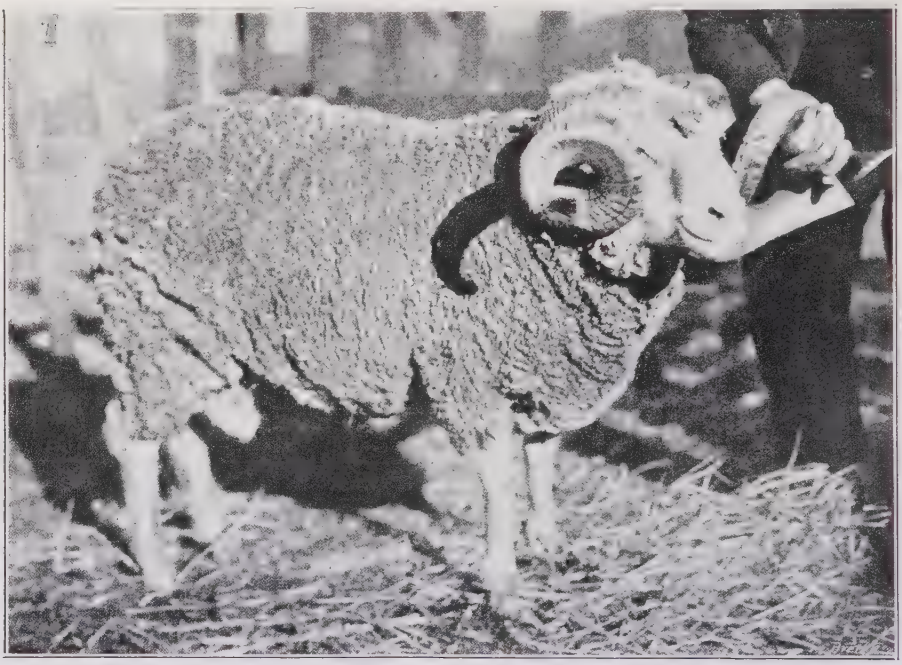


Plate 85.—A Typical Camden Park Ram.

Nowadays they would not be used in any flock, yet they were the foundation sheep of our great pastoral business.

In the late fifties Messrs. Pippin Brothers brought a flock of merinos to Wanganella from Victoria. They selected 100 ewes nearly pure Rambouillet, and had the good fortune to purchase in Sydney an imported French Rambouillet ram, called Emperor. (See plate.) From this ram is descended most of the splendid sheep to be found in Queensland and New South Wales flocks. A further accession to the Wanganella stud was two rams, imported by Messrs. Pippin in 1864. These rams were sons of "Old Grimes," a noted American ram, son of "Golden Drop," a ram for which its owners, Messrs. Hammond, refused 25,000 dollars. These two rams mixed beautifully with the Emperor blood, and the result is the present-day Wanganella. One celebrated sheep of the breed is pictured on one of the accompanying plates. His likeness to his famous ancestor of nearly seventy years ago is astonishing. Since the American sheep were imported and used there has been no outcross in the blood. The Camden flock and its descendants have been kept for sentimental reasons. They breed within themselves quite freely—as freely as any other flock.

Plate 86.—A Trio of Camden Park Merinos.

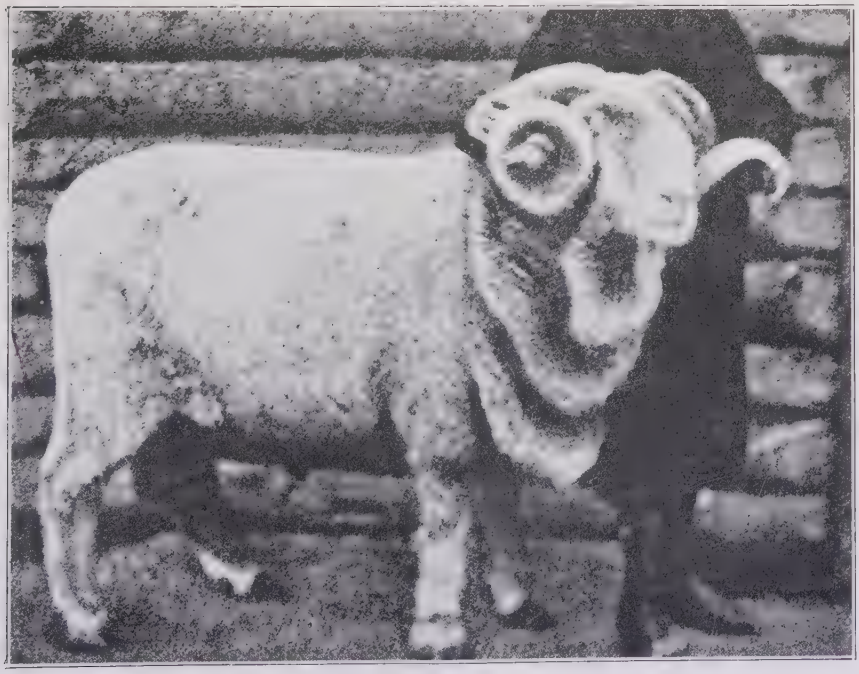


Plate 87.—Pippin's Famous Ram, "Emperor."

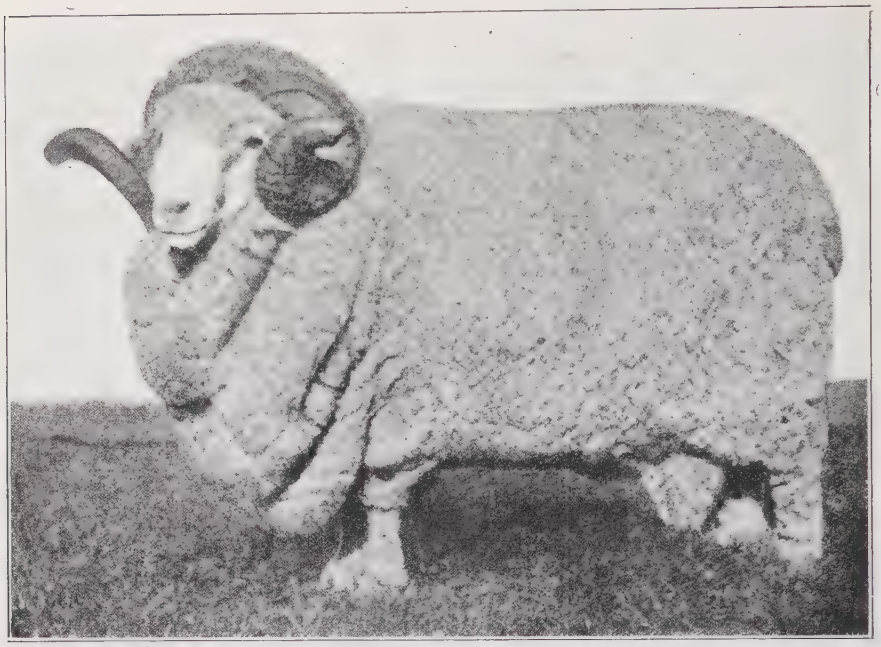


Plate 88.—The Big-bodied, Square-framed, Open-faced Merino of To-day.
A lineal descendant of "Emperor," of Wanganella fame.

A QUEENSLAND BUTTER POOL.

A notice advising the intention of His Excellency the Governor in Council to create a Butter Pool, which will apply to all factory butter produced within the State for twelve months from the date of the Order actually constituting the Pool, has been gazetted.

The Board to administer the Pool will consist of five elected by the Butter Factories in each of the following divisions:—

No. 1—The Butter Factories at Atherton, Malanda, Charters Towers, Bundaberg, Wowan, Rockhampton, Gladstone, Rockhampton and Mount Molloy, N.Q.

No. 2—The Butter Factories at Gayndah, Biggenden, Kingaroy, Maryborough, Mundubbera, Nanango, Murgon, Cooroy, and Gympie.

No. 3—The Butter Factories at Chinchilla, Clifton, Dalby, Miles, Toowoomba, Crow's Nest, Goombungee, Oakey, and Roma.

No. 4—The Butter Factories at Killarney, North Ipswich, Ipswich, Booval, Boonah, Grantham, Laidley, Allora, Goondiwindi, Mill Hill (Warwick), and Texas.

No. 5—The Butter Factories at Caboolture, Pomona, Eumundi, Esk, Kin Kin, Beaudesert, Maleny, Kingston, Woodford, Dayboro'.

In the event of a referendum being held to decide whether the Butter Pool should be constituted or not, votes will be given to butter manufacturers, and also to all persons who have supplied cream to butter factories at any time during the past twelve months.

Any petition asking for a poll to decide whether the Pool shall be constituted should reach the Under Secretary, Department of Agriculture and Stock, not later than the 12th November, 1923.

Nominations for seats on the Board will be received up to 5th November.

THE DAIRY HERD—QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Records for August, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Friesian	4 April, 1923	960	3·2	35·70	
Miss Security ..	Ayrshire	8 June, 1923	750	3·9	34·20	
College Grandeur	Jersey ..	11 July, 1923	480	5·3	30·	
Bellona	Ayrshire	3 Aug., 1923	638	3·8	28·42	
College Cold Iron	Jersey ..	23 April, 1923	480	4·9	27·60	
Lady Meg ..	Ayrshire	14 July, 1923	570	3·8	25·50	
Soprano ..	„ ..	14 June, 1923	480	4·6	24·30	
Comedienne ..	Jersey ..	11 July, 1923	480	4·6	24·30	
College Prima Donna	Friesian	19 Mar., 1923	570	3·5	23·10	
College Ma Petite	Jersey ..	12 June, 1923	450	4·4	23·10	
Pretty Damsel ..	Ayrshire	11 July, 1923	450	4·3	22·50	
Rainfall of Marinya	„ ..	29 Mar., 1923	510	3·7	21·90	
Charming Damsel	„ ..	27 April, 1923	480	3·9	21·90	
College Desire ..	„ ..	12 July, 1923	450	4·1	21·60	
College Evening Glow	Jersey ..	5 April, 1923	390	7·1	21·30	
Lute	Ayrshire	26 April, 1923	480	3·8	21·30	
College St. Martha	Jersey ..	25 June, 1923	360	5·	21·	
Lady Loch II. ..	Ayrshire	20 April, 1923	420	3·7	20·70	
Snowflake ..	Shorthorn	17 April, 1923	480	3·6	20·10	

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1923.

The first part of August was rather bleak, with prevailing westerly winds, but the month finished with finer weather, which set the birds to work in earnest. In the light section the highest scores were: C. H. Singer, 154; W. and G. W. Hindes, 150; N. A. Singer, 150. In the heavy breeds R. Burns with 152 and James Ferguson with 144 scored best. Mr. J. M. Manson's "B" bird died of peritonitis; this is the first death during the term. Scores:—

Competitors.	Breed.	August.	Total.
LIGHT BREEDS.			
*C. H. Singer	White Leghorns	154	631
*W. and G. W. Hindes	Do.	150	600
*N. A. Singer	Do.	150	605
*S. L. Grenier	Do.	134	559
*Ancona Club	Anconas	134	558
*Oakleigh Poultry Farm	White Leghorns	137	553
*Rock View Poultry Farm	Do.	120	523
*Beckley Poultry Farm	Do.	132	522
F. Sparsholt	Do.	129	516
*O. Goos	Do.	120	515
*Mrs. L. Andersen	Do.	135	509
*J. W. Newton	Do.	121	502
Jas. Hutton	Do.	103	497

EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS—*continued.*			
*J. M. Manson	White Leghorns	125	493
*J. W. Short	Do.	122	488
*R. C. J. Turner	Do.	128	485
*H. P. Clarke	Do.	134	482
*Bathurst Poultry Farm	Do.	120	472
*G. Williams	Do.	129	471
*Arch. Neil	Do.	122	459
G. Marks	Do.	106	459
G. W. Rogers	Do.	112	449
*C. A. Goos	Do.	124	444
*Mrs. R. E. Hodge	Do.	116	443
*A. C. G. Wenck	Do.	112	442
Jas. Harrington	Do.	102	436
*H. Fraser	Do.	117	431
W. A. and J. Pitkeathly	Do.	112	425
W. Becker	Do.	118	415
C. Quesnell	Do.	113	405
W. and G. W. Hindes	Brown Leghorns	113	400
Chapman and Hill	White Leghorns	105	393
Jas. Earl	Do.	101	392
*J. Purnell	Do.	126	389
*Mrs. E. White	Do.	105	375
E. Ainscough	Do.	113	371
Parisian Poultry Farm	Do.	112	353
*N. J. Nairn	Do.	119	348
HEAVY BREEDS.			
*W. Becker	Chinese Langshans	138	592
*R. Burns	Black Orpingtons	152	581
*Jas. Ferguson	Chinese Langshans	144	555
*Jas. Potter	Black Orpingtons	140	553
*Jas Hutton	Do.	130	541
*Mrs. A. E. Gallagher	Do.	131	541
J. R. Douglas	Do.	129	528
*E. Walters	Do.	121	504
*Mrs. A. Kent	Do.	131	503
*E. F. Dennis	Do.	121	496
*H. M. Chaille	Do.	110	486
R. Conochie	Do.	117	484
*Parisian Poultry Yard	Do.	141	483
W. T. Solman	Do.	139	481
*T. Hindley	Do.	132	478
*R. Holmes	Do.	122	467
Beckley Poultry Farm	Do.	101	437
G. E. Rogers	Do.	121	427
*C. C. Dennis	Do.	128	423
*J. H. Jones	White Wyandottes	117	421
Rev. A. McAllister	Black Orpingtons	123	417
Jas. Ferguson	Plymouth Rocks	106	407
W. F. Ruhl	Black Orpingtons	124	401
H. B. Stephens	Do.	107	393
W. G. Badcock	Chinese Langshans	117	376
V. J. Rye	Black Orpingtons	110	355
F. J. Murphy	Do.	110	277
Jas. Ferguson	Rhode Island Reds	100	263
Mos. Stephens	Black Orpingtons	107	241
Totals		8,194	30,928

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
C. H. Singer	94	135	104	89	98	111	631
W. and G. W. Hindes	90	109	93	86	114	115	607
N. A. Singer	90	107	112	107	95	94	605
S. L. Grenier	86	93	102	93	95	90	559
Ancona Club	87	92	113	80	88	98	558
Oakleigh Poultry Farm	105	98	86	86	98	80	553
Rockview Poultry Farm	95	102	91	89	71	75	523
Beckley Poultry Farm	93	77	68	91	96	97	522
O. Goos	77	92	94	82	80	90	515
Mrs. L. Andersen	63	93	98	98	78	79	509
J. W. Newton	90	89	80	61	86	96	502
J. M. Manson	82	74	100	98	77	62	493
J. W. Short	78	85	86	91	87	61	488
R. C. J. Turner	76	83	80	83	70	93	485
H. P. Clarke	93	54	91	74	88	82	482
Bathurst Poultry Farm	83	85	69	88	80	67	472
Geo. Williams	92	94	63	72	79	71	471
Arch Neil	68	72	58	90	97	74	459
C. A. Goos	75	93	66	77	63	70	444
Mrs. R. E. Hodge	66	75	65	87	80	70	443
A. C. G. Wenck	76	61	73	79	66	87	442
H. Fraser	79	61	66	68	77	80	431
J. Purnell	69	56	74	51	82	57	389
Mrs. E. White	54	60	79	69	59	54	375
N. J. Nairn	71	44	69	60	52	52	348
HEAVY BREEDS.							
W. Becker	103	110	105	95	96	83	592
R. Burns	106	77	92	87	136	83	581
Jas. Ferguson	99	105	85	88	92	86	555
Jas. Potter	75	104	91	89	83	111	553
Jas. Hutton	97	95	101	86	83	79	541
Mrs. A. E. Gallagher	87	97	89	91	87	90	541
E. Walters	104	106	75	75	70	74	504
Mrs. A. Kent	81	112	76	106	71	57	503
E. F. Dennis	99	85	76	78	83	75	496
H. M. Chaille	80	95	90	88	60	73	486
Parisian Poultry Farm	48	76	88	96	90	85	483
T. Hindley	83	93	91	92	59	60	478
R. Holmes	66	64	82	72	87	96	467
C. C. Dennis	71	81	46	76	73	76	423
J. H. Jones	71	74	79	72	45	80	421

P. M. PITT, Acting Principal.

THE ZILLMERE EGG-LAYING COMPETITION FOR AUGUST.

August was an important month in the National Utility Poultry Breeders' Association competition at Zillmere, as the final weighing of eggs was done during the first week. This year 109 out of 132 birds competing reached the 2-oz. standard, and the scores of those who failed to get the weight are indicated by the letter "u" placed in front of the figures.

Two thousand nine hundred and seventy-three eggs were laid during the month, an average of just over 22½ eggs per bird.

No. 63 had bowel trouble, otherwise there has been no sickness reported, nor has there been any cases of broodiness during the period.

EGG-LAYING COMPETITION—*continued.*

White Leghorns.

Pen No.	Owner.	Weight of Egg. Oz.	Aug.	Total.	Pen No.	Owner.	Weight of Egg. Oz.	Aug.	Total.
62	Miss L. M. Dingle ...	1.91	28	u131	45	F. R. Koch	1.97	24	88
75	W. Shaffrey	1.28	25	u121	48	R. D. Chapman ...	2.14	21	87
14	Enroh Pens	1.96	26	u120	73	A. Hodge	2.14	24	87
8	Oakleigh P.F. ...	2.08	25	114	10	R. C. J. Turner ...	1.95	24	u86
15	W. J. Berry	1.92	22	u114	57	H. Fraser	2.01	21	86
65	Robert Duff	2.02	27	109	2	Carinya P.F. ...	2.12	24	85
72	W. H. Forsyth ...	1.93	25	109	53	H. Holmes	1.86	27	u84
50	J. Harrington ...	2.00	25	108	37	G. Williams	2.10	23	83
66	Robt. Duff	2.11	26	108	36	J. T. Webster ...	2.05	22	81
27	H. T. Britten ...	1.95	25	u107	74	A. Hodge	2.08	22	81
54	H. Holmes	1.91	29	u105	40	J. Earl	2.19	23	80
81	J. E. G. Purnell ...	2.04	24	105	11	A. Neil	2.12	22	79
64	S. Lloyd	1.98	23	104	12	A. Neil	1.84	22	u79
33	A. S. Walters ...	2.09	26	103	56	G. Baxter	2.28	20	79
61	Miss L. M. Dingle ...	2.04	22	103	78	W. Smith	2.18	23	78
13	Enroh Pens	2.11	23	102	77	W. Smith	2.34	20	76
16	W. J. Berry	1.89	23	u102	23	Parisian P.Y. ...	2.09	23	75
22	M. F. Newberry ...	2.11	24	102	34	A. S. Walters ...	1.94	25	u74
30	W. and G. W. Hindes	1.97	24	101	35	J. T. Webster ...	2.07	20	74
51	Kidd Bros.	2.30	25	101	25	E. Stephenson ...	1.93	21	u73
41	W. Wakefield ...	2.07	23	101	86	L. Andersen	2.11	23	73
18	A. W. Ward	2.03	22	100	63	S. Lloyd	1.91	8	u71
49	J. Harrington ...	2.31	22	99	44	Kelvin P.F.	2.07	22	69
76	W. Shaffrey	2.22	21	99	6	P. J. Fallon ...	1.97	22	67
4	T. H. Craig	2.13	25	98	17	A. W. Ward	2.01	22	67
7	Oakleigh P.F. ...	2.08	23	98	85	A. Cowley	2.19	18	64
28	H. T. Britten ...	2.03	23	98	21	M. F. Newberry ...	2.12	24	63
19	W. Witt	2.06	26	96	46	F. R. Koch	2.21	20	63
43	Kelvin P.F.	2.01	24	96	58	H. Fraser	1.87	27	u63
59	G. Scaletti	2.24	25	96	24	Parisian P.Y. ...	2.09	19	61
70	R. Shaw	2.10	25	96	32	H. Needs	2.25	21	61
20	W. Witt	2.12	25	95	5	P. J. Fallon	2.04	20	59
3	T. H. Craig	2.31	22	95	39	J. Earl	1.99	22	59
38	G. Williams	2.01	24	95	67	J. and G. Green ...	2.14	17	59
84	L. Andersen	2.22	24	94	47	R. D. Chapman ...	2.08	25	54
55	G. Baxter	2.04	22	93	52	Kidd Bros.	2.02	24	47
42	W. Wakefield ...	2.09	23	92	79	W. Bliss	2.19	22	40
69	R. Shaw	2.21	25	92	68	J. and G. Green ...	2.19	16	39
29	W. and G. W. Hindes	1.89	24	u90	82	J. E. G. Purnell ...	2.07	21	39
1	Carinya P.F. ...	2.23	24	89	60	G. Scaletti	2.17	12	31
26	E. Stephenson ...	2.31	21	89	9	R. C. J. Turner ...	1.85	17	u27
31	H. Needs	2.49	23	89	80	W. Bliss	2.03	10	26
71	W. H. Forsyth ...	2.14	23	89	86	A. Cowley	2.13	13	21

Black Orpingtons.

95	J. Potter	1.98	29	138	116	C. C. Dennis	2.32	27	89
92	J. Pryde	1.85	25	u125	105	W. Smith	2.00	22	88
112	H. M. Chaille ...	2.13	24	119	118	E. C. Raymond ...	2.22	23	84
115	C. C. Dennis	1.83	27	u118	87	Parisian P.Y. ...	2.29	26	84
109	T. Brotherton ...	1.98	30	115	83	Parisian P.Y. ...	2.37	28	82
113	E. Walters	1.97	26	112	93	H. B. Stephens ...	1.77	18	u82
120	J. Harrington ...	2.39	25	110	108	E. F. Dennis ...	2.12	21	79
89	K. Macfarlane ...	2.07	29	108	114	E. Walters	1.94	22	u78
96	J. Potter	2.01	27	107	106	W. Smith	2.04	21	77
119	J. Harrington ...	2.54	18	107	91	J. Pryde	1.90	23	u75
104	L. Pritchard	1.99	22	105	94	H. B. Stephens ...	2.40	23	70
102	Enroh Pens	2.14	18	102	90	K. Macfarlane ...	2.58	22	65
101	Enroh Pens	2.16	28	101	99	S. Donovan	2.18	19	65
110	T. H. Brotherton ...	2.19	28	98	103	L. Pritchard	2.00	22	61
117	E. C. Raymond ...	2.09	27	95	98	W. Shaffrey	2.15	27	56
107	E. F. Dennis ...	2.10	18	94	100	S. Donovan	1.99	21	49
111	H. M. Chaille ...	2.23	24	93	97	W. Shaffrey	2.13	22	38

Other Breeds.

131	W. H. Forsyth (S.W.)	2.12	24	118	127	A. S. Walters (B.R.)	2.05	14	51
123	A. S. Walters (B.R.)	2.00	25	108	124	J. Ferguson (Anc.) ...	2.09	23	47
126	J. Ferguson (Lang.)	2.18	21	101	121	Parisian P.Y. (B.L.)	1.87	19	u43
125	J. Ferguson (Lang.)	2.05	26	94	130	R. A. Girling (Min.)	2.21	12	34
122	Parisian P.Y. (B.L.)	2.05	19	70	129	R. A. Girling (Min.)	—	9	22
133	J. Ferguson (Anc.) ...	2.09	19	59	132	W. H. Forsyth (S.W.)	1.66	19	u19

General Notes.

Regulations, Diseases in Poultry Act.

Regulations have been issued under the recently enacted Diseases in Poultry Act. These Regulations are on the same lines as the Regulations under the Diseases in Stock Act.

State Wheat Board Election.

A Regulation has been issued under the Wheat Pool Act the effect of which is that the electors for the forthcoming election for members of the State Wheat Board, for the season 1923-24, shall be those growers of wheat who have delivered to the Board wheat harvested during the season 1921-22 or 1922-23.

Appointments.

Harold Henry Collins has been appointed Chairman of the Atherton Maize Pool Board.

R. R. Anson has been appointed Assistant Instructor in the Cotton Section of the Department of Agriculture and Stock.

B. R. Riley has been appointed Millowners' Representative on the Central Sugar Cane Prices Board, in the room of P. M. H. Goldfinch, resigned.

Milk Pool Nominations.

The following nominations have been received by the Department of Agriculture and Stock for positions on the Board to administer the proposed Milk Pool:—

William Johnston, Strathpine.
R. J. Morgan, senr., Strathpine.
A. W. Johnston, Thagoona.
John Coch, Kircheim.
W. J. Hawkins, Bald Hills.
Francis Fredericks, Bald Hills.
W. R. Moon, Brookstead.
A. B. McDonald, Rocklea.
W. C. Reading, Dakabin.
J. P. Walsh, Rosewood.
F. A. Tullock, Veresdale.
R. E. Clay, Samson Vale.

More than the requisite number of dairymen, as provided for in the Act, have asked for a referendum on the question as to whether the pool shall be constituted, and accordingly a vote will shortly be taken to decide whether the pool shall be established or not.

Dingo and Marsupial Destruction.

The Regulations have been issued under "*The Dingo and Marsupial Destruction Acts*, 1918-1923," the effects of which are as follows:—

No person shall keep in his possession in or upon any premises any live dingo or fox unless he has previously obtained the permission of the Minister to keep such animal for zoological purposes.

The bonus payable in respect to scalps under the Act shall be 15s. for the scalp of a dingo, 5s. for the scalp of a fox, 3d. for the scalp of a wallaby, 2d. for the scalp of a kangaroo rat, paddymelon, or bandicoot.

By the amending Act recently passed the payment of the bonus for dingoes and foxes is now compulsory by all Boards, but whether they pay the bonus for the other animals mentioned will be optional with each of them.

Provision is now made that a clerk or receiver shall permit the whole of the skins to be produced in lieu of the scalp for the purpose of securing a payment certificate, and shall by means of approved pliers so mark the skin that it cannot be presented again for payment. The primary object of this is to prevent the destruction of fox skins, which have a distinct marketable value.

Under the Regulation they can now be marked, secure a bonus certificate, and be returned to the trapper.

Progressive Gympie.

The annual return of the output of primary products in the Gympie district, as compiled by the Gympie and District Progress Association, will serve to show what a productive district Gympie is. This district offers every opportunity to the willing and energetic settler to acquire lands suitable for almost every primary product. For dairying, fruit, cotton, canegrowing, agriculture, poultry-farming, pig-raising, and bee-keeping it is especially adaptable. The annual rainfall is about 60 in. per annum; the numerous creeks and the tortuous Mary River assure a permanent water supply. Markets are easily accessible, and a special train leaves weekly with fruit and produce for the Sydney, Melbourne, and Adelaide markets, whilst the local demand is fast increasing. The total output of primary products from 1st January to 31st December, 1922, as compiled by the association, is set down under their several headings. The output of honey amounts to several hundred tons.

	£
Butter, 5,493,650 lb., for which suppliers were paid	343,178
Timber	317,586
Fruit (bananas, pineapples, &c.)	195,021
Agricultural produce	112,718
Gold, 18,497 oz., valued at	64,034
Pigs, 12,556, realised	27,960
Minerals (manganese ore, lime, &c.)	2,551
Total value	£1,063,048

Staff Changes and Appointments.

Mr. J. S. Penrose, B.V.Sc., M.R.C.V.S., and Mr. M. J. Reidy, M.R.C.V.S., the recently appointed part-time Veterinary Officers for the Northern and Central Districts respectively, have been appointed Inspectors under the Diseases in Stock Act.

Mr. Maurice Wall has been appointed Assistant Cane Tester at Bingera Sugar Mill at Bundaberg, as from the 22nd August, until the cessation of crushing operations at that mill.

Police Constable H. H. Taylor has been appointed an Inspector of Slaughter-houses.

The constitution and rules of the Central Queensland Native Birds' Protection Association have been approved under "*The Animals and Birds Act of* 1921," and Messrs. L. T. Jones, H. W. Walker, John F. C. Richter, C. W. Wright, L. F. Landsberg, A. Alden, C. A. Moloney, A. V. Lucas, A. C. Boldeman, and P. V. Moloney of that Association have been appointed Officers under and for the purposes of the abovementioned Act.

Mr. W. H. J. Parker has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. J. K. Murray, science master and lecturer in bacteriology at the Hawkesbury Agricultural College, New South Wales, has been appointed Principal of the Queensland Agricultural High School and College, at Gatton. Mr. Murray holds the degrees of B.A. and B.Sc.Agr. of the University of Sydney, and he also holds the National Diploma in Dairying (N.D.D.) of the Dairy School for Scotland. His work at the Hawkesbury College comprised lecturing upon agricultural and dairy bacteriology, dairy technology, and the feeding of farm animals. During the war he served with the Australian Imperial Forces, and subsequently he attended a school of instruction at Kilmarnock, Scotland, at which he gained the National Diploma in Dairying. He was one of that able company of Australian agriculturists who staffed the agricultural farm at Sutton Veny, on Salisbury Plain, which was established by the A.I.F. Education Service after the Armistice, with the object of fitting Diggers for rural life after their discharge from the Army. Like many more far-sighted and energetic Australians who proved themselves in agricultural schools in Scotland and other parts of the United Kingdom, he took full advantage of the opportunities offered under the non-military employment section of the A.I.F. Education Service while awaiting repatriation. The remarkably fine work of the A.I.F. Education Service, particularly for agricultural and stock students, has never been properly recognised in Australia. Under that scheme Diggers were enabled to obtain the best of practical tuition from the leading agriculturists and stockbreeders in Great Britain. Agricultural and stock tours of selected students through all the agricultural counties of the United Kingdom, to the Channel Islands, Denmark, and America were arranged. In addition short intensive courses on agricultural and stock subjects were provided in the Colleges and Universities. Mr. Murray was one of those who seized and made the best of the unique and extraordinarily good opportunities offered to A.I.F. men. Before returning to Australia Mr. Murray visited the United States and Canada, and made exhaustive

inquiry respecting agricultural education in many of the colleges and schools there. He was strongly recommended for the position to which he has been appointed by Professor R. D. Watt, Dean of the Faculty of Agriculture, University of Sydney, and by H. M. Potts, F.C.S., late Principal of the Hawkesbury Agricultural College. The Government has requested him to enter upon his duties at as early a date as possible.

Mr. L. L. Gudge, the cotton-grader appointed by the Government, has arrived in Brisbane from Great Britain. He was selected through the Agent-General (Hon. J. A. Fihelly) on the recommendation of leading cotton authorities of Great Britain.

Codlin Moth Control.

Now that the season for spraying for the control of codlin moth is advancing, the Chief Instructor in Fruit Culture (Mr. J. M. Ward) calls the attention of growers of apples and pears to the following Regulations under "*The Diseases in Plants Act of* 1916":—

"No occupier or owner or his agent of an orchard shall permit any fruit, whether diseased or not, to lie on the ground, and shall forthwith gather all fruit lying on the ground and destroy all that are diseased by submitting them to the process of boiling, or as otherwise instructed by an inspector.

"The occupier or owner or his agent of any orchard in which codlin moth of pip fruit is present shall cause all bearing apple, pear, and quince trees to be sprayed with an approved brand of arsenate of lead, to the satisfaction of an inspector. The first spraying shall be given when the petals are falling from the flowers, and two or more subsequent sprayings, as may be deemed necessary by an inspector, shall be given at intervals not exceeding twenty-one days from the time of the first application.

"The occupier or owner or his agent of any orchard in which codlin moth of pip fruit is present shall cause all apple, pear, and quince trees to be kept clear of dead bark and broken limbs. Any stakes, props, or other material likely, in the opinion of an inspector, to harbour the larvæ or pupæ of the codlin moth of pip fruit shall be removed, and, if found to be infested, destroyed by the said owner or occupier."

It will be seen by the foregoing Regulations that, among other things, it is compulsory to spray for the purpose of keeping under control that troublesome pest, the codlin moth.

Providing growers will carry out thorough spraying with arsenate of lead at the correct periods, codlin moth can practically be eliminated from an orchard.

During the first application of the spray material it is wise to fill the calyx of each fruit with a small quantity of the poison before the closing of the calyx. This acts as a protection for the fruit against the insect for a considerable period.

The closing of the calyx of the apple takes place before that of the pear.

During the second application—when the fruit is about the size of a pigeon's egg or thereabouts—care should be taken to see that the upper portion of the foliage is well covered with the spray. In many instances the moth lays its eggs upon the foliage, and when the caterpillar hatches out it may consume portion of the leaf before it reaches the fruit, therefore by having the foliage well covered with the arsenate of lead, the young caterpillar becomes poisoned when having its first meal and before any damage to the fruit is done.

The third spraying should be chiefly confined to thoroughly covering the fruit, so that upon the insect attacking the fruit it first has to eat through a poisonous covering and is therefore killed.

It may be to the growers' interest to apply a fourth spray; in this respect one will have to be guided by circumstances. If the season is a dry one it will be found that it pays to apply a fourth application. Thoroughness of application is absolutely essential if good results are to be obtained.

The writer has proved over and over again that an orchard can be kept comparatively free of codlin moth if spraying with arsenate of lead is properly carried out.

During the 1921-1922 fruit season the writer had a number of demonstration plots in Tasmania, where special attention was directed towards spraying for the pest in question.

In the orchard of Mr. C. S. Marsh, of Huonville, only one spraying had been carried out the previous year, when the amount of infected fruit was 60 per cent.

During the 1921-22 season the trees were sprayed three times with Jacques' "Elephant" brand arsenate of lead (paste) as follows:—

First spraying, 5th November: 2 lb. arsenate of lead to 40 gallons water.

Second spraying, 26th November: 2 lb. arsenate of lead to 40 gallons water.

Third spraying, 24th December: 2 lb. of arsenate of lead to 40 gallons water.

The first application was made whilst the calyx was open on the Scarlet Nonpariels, but was rather late with the Ribston Pippins, as fully 50 per cent. of them were beyond the calyx stage. Notwithstanding this, the loss of fruit owing to being affected with codlin moth during the season already mentioned amounted to only 4 per cent., which, compared with a 60 per cent. loss the previous year, was highly satisfactory.

During the same season, another demonstration plot was obtained at the orchard of Mr. H. Cuthbert, of Franklin. The varieties sprayed being Ribstons, Scarlet Nonpariel, Sturmers, King of Pippins, and French Crabs, also a few pear trees; all of these were badly infested with codlin moth the previous year. The plot was divided into four sections each of two rows, and a different brand of arsenate of lead used on each section. Following are the formulæ and dates of application:—

First spraying: 28th October, 1921.

Second spraying: 18th November, 1921.

Third spraying: 3rd December, 1921.

Two rows sprayed with Swifts (paste form) of arsenate of lead, 2 lb. to 40 gallons water.

Two rows "Vallo" arsenate of lead, 2 lb. to 40 gallons water.

Two rows "Blue Bell" arsenate of lead, 2 lb. to 40 gallons water.

Two rows Sherwin-Williams (powder), 1 lb. to 40 gallons water.

From the first picking of the fruit a careful record of infested fruit was kept, and the loss of fruit from codlin moth amounted to only 3 per cent. As far as could be seen there was no difference in the various brands of arsenate of lead used; all gave equally good results.

The owners of the orchard sprayed a portion of the remaining part of the orchard twice only, and from this section the loss was 7 per cent.

By the above experiments it can be seen that in practice the numbers and thoroughness of application governs, to a very great extent, the control of this pest.

It may be well to mention that the trees in question were from thirty to forty years old and fairly large.

When using the paste form of the lead, use 5 to 6 lb. per 100 gallons of water, and the powder from 2 to 3 lb. per 100 gallons. The fruit inspectors in the Stanthorpe district have been instructed to be strict in enforcing the Regulations in respect to codlin moth. By doing this it will be for the ultimate good of individual growers and the district as a whole.

Citrus Bug Control.

The efficacy or otherwise of various applications against the Bronze Orange Bug of citrus trees has recently been tested by members of the staff of the Fruit Branch, Department of Agriculture, in infested orchards at Montville. Cyanide gas was first given attention, varying strengths being applied—from what is set down as a normal dose to increased dosages up to 75 per cent. From results, it was deduced that a 50 per cent. increase and twenty-minutes application was sufficient to cause the bug to fall to the ground, where a percentage recovered from the effects of the gas, 63 to 93 per cent. being destroyed. From this it was evident that cyaniding alone would not be taken as totally efficient. Numerous spraying formulas were applied, but the results were less encouraging. Practically all of standard sprays usually applied against scale insects had been extensively tried by various growers, consequently miscible oils, kerosene emulsion, and lime-sulphur solution were omitted. Resin wash (reduced to 1 lb. of resin in 3 gallons of water) gave poor results. Pyrethrum solution, Katakilla, Blackleaf 40, Salomia and Derrisene, at increased strengths were equally unsatisfactory, and the addition of resin as a sticker did not materially add to their values. "Bouilli Labordi," a previously untried application, the formula being received from the Agricultural Chemist, gave the best results.

From these experiences, it is deduced that a dual application is necessary to encompass the complete destruction of the pest—cyaniding to cause its fall to the ground, where its accessibility admits of its being conveniently dealt with either by spraying with concentrated kerosene emulsion or caustic-soda-arsenic solution.

The following spray formulæ were liberally applied to the trees and foliage:—

Pyrethrum, 1 oz. in 2 gallons of water.

Katakilla, 4 oz. in 2 gallons of water.

Salomia, 10 oz., Derrisene 1 oz., in 2 gallons water.

Resin, 1 lb., soda ½ lb., in 3 gallons water.

Blackleaf 40, 1 oz., resin 1½ lb., soda ¾ lb., in 6 gallons of water.

"Bouilli Labordi," 8 oz. resin, 3 oz. caustic soda, 6 oz. methylated spirits, 5 oz. strong liquid ammonia, 1 quart water. Heat if necessary to dissolve resin and dilute 1 in 15.

Answers to Correspondents.

Home-grown Cabbage Seed.

"Ambitious" (Wynnum)—

There is no reason why cabbage and cauliflower seed grown in the Brisbane district should not prove fertile. In order, however, to prevent cross-fertilisation it will be necessary to cover the heads of the plants, prior to the flower opening, with fine mosquito netting. If this is done the seed should come true to type.

Whether the seed will have the same vitality as that grown in a colder district it is not certain. There is some uncertainty as to whether the plants grown from the seed here will possess the same stamina as those grown from seed matured in a colder climate.

Grasses and Fodder Crops.

"Breeder" (Warra)—Mr. A. E. Gibson, Instructor in Agriculture, advises:—

(1) Prairie Grass (*Bromus unioloides*) would, it is thought, give you more permanent results than *Phalaris bulbosa*, apart from which the seed of the former is more readily procurable in this State. It is doubtful whether you will be able to obtain seed of *Phalaris bulbosa* in this State, although it may probably be obtained from seedsmen in Sydney or Melbourne.

(2) Of the three mentioned—*i.e.*, Perennial Rye Grass, Cocksfoot, and Rhodes Grass—the lastmentioned is the only one which will stand the climatic conditions usually experienced in your district.

(3) Practically speaking, there is little to choose between any of the members of the saccharine sorghums for ensilage purposes, but perhaps for general utility purposes Soudan Grass is to be preferred, with Nuphee Sorghum Saccharatum, Saccaline, and Early Amber Cane next in order of succession.

(4) Soudan Grass conserved in the form of hay, for which purpose it is applicable by reason of its slender stalk, would be found perhaps the most useful.

(5) In this instance you probably refer to cereals and would therefore mention barley (feed), peas, and wheat for winter, and maize and grain sorghums for summer sowings. Artichokes (Jerusalem) and sugar-beet are useful forms of root crops for summer and winter sowing respectively.

(6) Pigs thrive on lucerne; but for fattening purposes some form of concentrate should be given in addition.

(7) The sowing of crops for grazing-off purposes, excepting that of grass, is not recommended, it being considered that the practice of feeding-off is wasteful. Fodder crops of the following varieties should be cut and fed to stock, and will be found beneficial for milk-production purposes:—Lucerne, millets, panicums, sorghums, and suchlike summer-growing crops, whilst a mixture of peas or vetches with either rye, barley, oats, or wheat forms a useful fodder for winter growing.

(8) It is quite possible during seasons of normal moisture to produce linseed (flaxseed) as a winter-growing crop in your district, providing, of course, that careful attention has been given to the initial preparation of the soil. Millet is a summer-growing crop and is quite separate and distinct from linseed.

Soudan Grass.

"A.H." (Wondai)—

All of the Sorghum family are dangerous to stock prior to flowering. Soudan grass (a member of the Sorghum family) should not be grazed off at any time; that method is too wasteful. Cut for hay or conserved as ensilage it is amongst the best of the family. Prussic acid is present in greater or lesser quantities during the immature stages of all Sorghum growths.

To Scour and Tan Sheepskins.

R.S. (Beechmont)—Mr. W. G. Brown, Sheep and Wool Expert, advises:—

For preference the skin should be in what is called the "green" stage—*i.e.*, it must never have been dried after removal from the animal. The skin should be scraped and all fatty particles removed. Then soak it in a strong soapy solution, using a fair-sized tub. The skin and wool is thus easily washed snow white. Be sure to wash in clean cold water after removing from the soapy water. Then take a clean bag, or square of calico, and lay the skin upon it, woolly side down, and apply a solution of salt and alum. Proportions are one part alum to two of salt. This should be applied over the whole of the pelt with a swab, and at a temperature of about 100 degrees Fahr. The number of applications vary as the thickness of the pelt. Lambskins, for instance, require about three applications; mature sheepskins require four or five applications. Cover the pelt between the operations. The skin is then allowed to dry in the shade, and then a flat piece of sandstone can be used to soften the skin. It will be a pure white colour. The final touch should be given with pumice stone, which gives a smooth finish. In the case of dry skins, they must be soaked in soft water for about three days. The procedure described may then be adopted.

Curriers and tanners use knives made especially for the work.

After the skins are dealt with as described they should be placed pelt side down on a table and a flexible cane or smooth stick applied across the end hanging over the edge, and thoroughly beaten from the butt to the tip of the staple. This opens out the wool and removes sticks and light seeds and other foreign substances.

A COLLEGE ON WHEELS.

The travelling domestic science car just built at the Ipswich railway workshops is, as far as the knowledge of education officials goes, the first of its kind in the world. Certainly it is the first in Australia. The car has set out on its educational mission along the Western line. Two members of the staff will give demonstrations at Charleville, and then the car will proceed to Cunnamulla, where a course of some seven weeks, extending to the Christmas vacation, will be given to the girls of this outback district. The second car, which is also being built at the Ipswich works, will be ready in about five weeks' time. The real object of these travelling cars is to impart a knowledge of domestic science to girls in centres where the population is not large enough to warrant the establishment of permanent classes.

Farm and Garden Notes for November.

FIELD.—The recent unfavourable weather experienced throughout the wheat areas must naturally affect the ultimate yields. Many wheat areas are already beyond rain redemption. Harvesting on the Downs may be expected to commence in the latter part of October; but, unfortunately, it is not likely to extend over any lengthy period. Growers who have suffered a seasonal setback would be well advised to push on with recultivation for the purpose of making a saver out of cotton. Now is the cotton planting season, and delay in districts usually subject to early frosts means a risk of failure to secure a cotton rake-off.

Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COAST DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, exeecpting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur

spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for Downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruits that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruits profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully and, on its first appearance in a district, all ripening fruits should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·34	5 50	5·4	6·8	4·51	6·31
2	5·33	5·50	5·3	6·9	4·51	6·32
3	5·32	5·51	5·2	6·10	4·51	6·33
4	5·31	5·51	5·1	6·11	4·50	6 34
5	5·30	5·52	5·0	6·12	4·50	6·35
6	5·29	5 52	5·0	6·13	4·50	6·36
7	5·28	5·53	4·59	6·13	4·50	6·36
8	5·27	5·53	4·59	6·14	4·50	6·37
9	5·25	5·54	4·58	6·14	4·51	6·37
10	5·24	5·54	4·57	6·15	4·51	6·38
11	5·23	5·55	4·57	6·16	4·51	6·39
12	5·22	5·55	4·56	6·17	4·52	6·39
13	5·21	5·56	4·56	6·18	4·52	6·40
14	5·20	5·56	4·55	6·18	4·52	6·40
15	5·19	5·57	4·55	6·19	4·53	6·41
16	5·17	5·58	4·54	6·20	4·53	6·41
17	5·16	5·58	4·54	6·20	4·53	6·42
18	5·15	5·59	4·53	6·21	4·54	6·42
19	5·14	6·0	4·53	6·22	4·54	6·43
20	5·13	6·1	4·52	6·23	4·55	6·43
21	5·12	6·1	4·52	6·24	4·55	6·44
22	5·11	6·2	4·52	6·25	4·56	6·45
23	5·10	6·3	4·52	6·25	4·56	6·45
24	5·9	6·3	4·52	6·26	4·57	6·46
25	5·9	6·4	4·51	6·27	4·57	6·46
26	5·8	6·4	4·51	6·28	4·58	6·47
27	5·7	6·5	4·51	6·28	4·58	6·47
28	5·7	6·5	4·51	6 29	4·59	6·48
29	5·6	6·6	4·51	6·30	5·0	6·48
30	5·6	6 7	4·51	6·31	5·0	6·49
31	5·5	6·7	...	...	5·1	6·49

PHASES OF THE MOON, OCCULTATIONS, &c.

3 Oct.	☽	Last Quarter	3 29 p.m.
10 „	●	New Moon	4 5 p.m.
17 „	☾	First Quarter	6 54 a.m.
25 „	○	Full Moon	4 26 a.m.

Perigee Oct. 11th at 1·42 p.m.
Apogee Oct. 26th at 12·36 p.m.

The moon will be apparently very close to the planet Mars on the 9th at 4·49 a.m., just before sunrise. About seven hours later the moon will be in conjunction with the planet Mercury. Shortly afterwards Venus and Saturn will be in conjunction at 3·47 p.m. On the 17th at 9 p.m. Saturn will be in conjunction with the sun.

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2 Nov.	☽	Last Quarter	6 49 a.m.
9 „	●	New Moon	1 27 a.m.
15 „	☾	First Quarter	7 41 p.m.
23 „	○	Full Moon	10 58 p.m.

Perigee 9th Nov. at 1 a.m.
Apogee 22nd Nov. at 12·54 p.m.

Neptune will be in conjunction with the moon on the 3rd at 5·47 a.m. Venus and Jupiter will be in conjunction on the 5th at 6·11 a.m about 15 degrees east of the sun and setting about an hour later than it. Mercury will be in superior conjunction with the sun on the 16th at 10 a.m., passing it on the far side from west to east. It will be in conjunction with Jupiter on the 20th at 3·53 p.m.

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8 Dec.	●	New Moon	11 30 a.m.
15 „	☾	First Quarter	12 38 p.m.
23 „	○	Full Moon	5 33 p.m.
31 „	☽	Last Quarter	7 7 a.m.

Perigee 7th Dec. at 1 p.m.
Apogee 19th Dec. at 9·12 p.m.

The planets Mars and Saturn will be in conjunction but apparently separated by three diameters of the moon on the 2nd at 5·42 p.m. Saturn will be in conjunction with the moon but more than three diameters above it at 9 a.m. on the 5th. About two and a-half hours later Mars will be in conjunction with the moon but a good deal further above it. Mercury will be at its farthest distance east of the sun on the 28th at 2 a.m., setting about an hour and a-half after it.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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